The Royal Institution of Naval Architects (RINA), an international organization representing naval architects in over 90 countries, has accredited the Westlawn Institute of Marine Technology's Yacht & Boat Design Program. Both organizations exist to promote and enhance knowledge and understanding of naval architecture and boatbuilding and to serve the needs of the marine industry. Their goals are to assist their members or students to design, supervise, construct, manage, or repair boats or ships of the highest quality. Westlawn has been training boat designers for over eighty years and RINA has been serving naval architects and the marine industry for over 150 years demonstrating truly long-term commitments to their goals.

Universities and training providers whose academic and professional courses provide the knowledge and understanding which underpin the professional skills required by those involved in the design and construction of maritime vessels and structures may apply to have their course accredited by the Royal Institution of Naval Architects.

The Institution assesses such courses against the standards required for full membership of the Institution. It considers the content of the course for its scope and applicability to the design and construction of marine vessels and structures.

Kathy & Jerry Wood Foundation Make 2nd Annual Contribution to Westlawn Scholarship Fund! Largest Scholarships in Westlawn History!! - Page 3

Yachting Magazine May 2011 Features Article on Westlawn Institute - Page 8
ABYC
613 Third St., Suite 10
Annapolis, MD 21403
410-990-4460

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*Another major benefit of membership is FREE standards based technical assistance from the experienced ABYC staff. These respected experts act as your consultants on all aspects of the marine industry and are as close as a phone, fax, or email. ABYC members also receive regular updates on the work of the technical committees on new and revised standards. If you can answer "Yes" to even just one of these questions, then ABYC membership is for you. Business memberships start at only $245.00 a year.

Click on "Join ABYC" to go to the ABYC website and complete the application. You will be on your way to joining an association that prides itself on its service to members and safety standards for the marine industry.
The Westlawn Institute of Marine Technology is pleased to announce that we have received the second year's donations for the most substantial grant and scholarship program the school has ever offered! For qualifying U.S. students, tuition will be effectively reduced to levels last seen in the early 1980s!

All the funds donated by the Wood Foundation for 2010, were expended in scholarships and grants for students before the end of the year under the terms of the donation. We’re looking forward to assisting more students again this year.

This program has been made possible by the generous support of the Kathy & Jerry Wood Foundation, which has committed to donating $90,000, at $30,000 per year for three years (2010, 2011 and 2012), to provide tuition assistance for all Westlawn students who are eligible. Grants and scholarships will be available until the donated funds are expended for a given year.

Mr. Jerry Wood dedicated much of his life to the support of boating and education. In fact, he established the Annapolis Sailing School in 1959, which soon became the largest commercial sailing school in the United States. With his wife Kathy, he went on to create the first in-the-water all-sailboat show, which revolutionized boat shows, and lead Kathy and Jerry to create the United States Powerboat Show—also in Annapolis—two years later. Over the years, the Wood’s businesses have employed over 3,000 young people and young adults helping to train and mentor them to prepare to move out into the world to become well-rounded mature individuals.

Westlawn’s parent company is The American Boat & Yacht Council (ABYC) based in Annapolis, MD. ABYC headquarters is within walking distance of the Annapolis Boat Show and is even closer to Kathy and Jerry’s former Annapolis home.

“The connections between Westlawn Institute and ABYC and the history and goals of Kathy and Jerry Wood, are remarkable,” said Sallie Hamrick, President of the Kathy and Jerry Wood Foundation. “Not only are both organizations dedicated to boating and education, but also to enhancing boating safety and to encouraging our nation’s youth to pursue the enjoyment of boating and careers in the boating industry. We are particularly touched that Jerry and Kathy will continue to serve the boating community by helping students learn to design boats and yachts that will be joyfully used for generations to come.”

“Wealthlawn is extremely grateful to the Kathy and Jerry Wood Foundation,” noted Westlawn director Dave Gerr. “The scholarships and grants the Wood Foundation are making possible will be a tremendous help to our students, and it’s even more satisfying to know that we’ll be continuing the tradition that Kathy and Jerry Wood established both assisting in education and in supporting boating.”

“ABYC’s president, Skip Burdon, was instrumental in making the connections that resulted in this invaluable support,” continued Gerr. “It’s a perfect example of how important it is to be part of ABYC, and of the deep commitment that ABYC has to boating education and standards.”

For U.S. Citizens Only
Under the terms of the funding, the Kathy and Jerry Woods grants and scholarships can be awarded to U.S. citizens only.

Grants for Newly Enrolling Students:
All students, who are U.S. citizens, who meet Westlawn admission requirements, will be eligible for a $1,500 grant toward their tuition in Module 1 in the full Yacht & Boat Design Program, or toward the tuition for the Elements of Technical Boat Design course.

Regular tuition for one module (U.S. students, 2011) is $2,800. Students enrolling with a $1,500 Wood Foundation grant may either pay the entire tuition balance of $1,300, or they may elect to enroll under the zero-interest monthly payment plan as follows:

1. $690 initial payment followed by 10 monthly payments of $61.00 per month.
Scholarships for Academic Achievement
GPA of 90% or Higher
Scholarships will be awarded to current students, who are U.S. citizens, who are enrolling in the next module of study at Westlawn. Students with a GPA of 90% or higher will receive a $1,500 scholarship toward the tuition of their next module, upon enrollment in that module.

Regular tuition for one module (U.S. students, 2011) is $2,800. Students enrolling with a $1,500 Wood-Foundation academic scholarship may either pay the balance of $1,300, or they may elect to enroll under the zero-interest monthly payment plan as follows:

$690 initial payment followed by 10 monthly payments of $61.00 per month.

Scholarships for Academic Achievement
GPA between 85% and 89%
Scholarships will be awarded to current students, who are U.S. citizens, who are enrolling in the next module of study at Westlawn. Students with a GPA between 85% and 89% will receive a $1,000 scholarship toward the tuition of their next module, upon enrollment in that module.

Students enrolling with a $1,000 Wood-Foundation academic scholarship may either pay the balance of $1,800, or they may elect to enroll under the zero-interest monthly payment plan as follows:

$690 initial payment followed by 10 monthly payments of $111.00 per month.

All tuition payment amounts and terms will be adjusted to reflect any change in tuition applicable to new enrollments.

The scholarships granted for academic achievement with a GPA will be the “Wood Scholarships,” and the recipients will be known as “Wood Scholars.”

Scholarships and grants from funds donated by the Wood Foundation may not be applied retroactively, and may only be awarded for enrollments that occur after June 21, 2011.

Contact Patti Schulte, student services coordinator, to apply for the Wood Grants and Scholarships: pschulte@westlawn.edu

FREE AutoCAD, Deep Student Discounts on Software & Drafting Supplies
Westlawn has arranged for FREE student AutoCAD and for deep discounts on Orca3D and Rhino packages, as well as for discounts on MaxSuf and ProSurf. General purpose software is also available at academic discounts.

Be sure to refer to the Westlawn student forum for complete details to take advantage of these substantial savings.

RINA Accreditation — Continued from page 1

The Institution considers that the Yacht & Boat Design Program provided by Westlawn Institute of Marine Technology meets these standards, and therefore provides good preparation for those who wish to practice of yacht and boat design and construction.

RINA Chief Executive, Trevor Blakeley, stated, “Westlawn Institute of Marine Technology has a well deserved international reputation for its programmes, and it is a pleasure for the Royal Institution of Naval Architects as an international professional society to accredit its Yacht & Boat Design Course.”

“RINA is one of the foremost organizations dedicated to enhancing the art and science of naval architecture,” said Westlawn Institute director Dave Gerr. “It’s an honor to have Westlawn Institute’s Yacht & Boat Design Program accredited by RINA. Not only does this recognize the breadth and quality of the Westlawn program, but adding RINA accreditation to our long-standing DETC accreditation provides our students and alumni with an additional international confirmation of the marine industry’s broad acceptance of Westlawn Institute training.”
In the previous issue we looked at the fuel consumption and range of early offshore powerboats, and began our examination of powerboat efficiency, by using transport efficiency and miles per gallon to compare boats. We saw how longer more slender hulls could be moved farther faster for the same amount of fuel. Comparing different hull forms normalized for displacement, we also saw that driving boats at lower speed/length ratios also improved efficiency. We’ll conclude our discussion of powerboat efficiency here by looking at the effect of improving propulsion machinery and also at the effect that overall size has on efficiency. We’ll also consider how efficient slender hull forms affect seakeeping, comfort, and accommodations.

The Effects of Larger Diameter Propellers

Taking our 67-foot Ironheart, we can get an idea what additional performance can be garnered from increasing propeller diameter, which means reducing shaft rpm. If we assume a standard 3:1 gear on Ironheart’s 419-hp engine, we’d find a 4-blade propeller of 40-in. diameter by 36-in. pitch, for an approximate propeller efficiency of 65%. If we could install a larger 5:1 reduction gear (and a much larger propeller) we could then install a 56-in. diameter by 67-in. pitch 3 blade, with an approximate efficiency of 73%. The reduction in horsepower from the increase in efficiency can be found from:

Resulting HP = original HP x standard efficiency ÷ new efficiency

In this case, 0.65 ÷ 0.73 = 0.89 or 89%

Accordingly, where we needed 113 hp for 13.3 knots, we would only need 101 hp; and for 16.9 knots we would require 373 hp rather than 419. Obviously, this would increase transport efficiency and thus fuel economy.
Note that this larger-propeller-diameter gain applies for boats in the semi-planing speed range and below. At high-planing speed, smaller diameter and higher pitch (given sufficient blade area to absorb thrust) are more efficient.

**Better Seaboats**
As good as long slender hulls are at being efficient they offer still another advantage—they are better seaboats. Long slender hulls can be driven faster in more elevated sea states than wider shorter craft. Slamming and pounding are much reduced, which in turn makes for greater comfort, better crew performance, and lower loads on the hull, machinery, and gear. This critical consideration is often overlooked in evaluating the advantage of slender hulls. It shouldn’t be.

**Cabin Layouts in Slender Hulls**
One of the drawbacks to slender hulls is working in comfortable accommodations. You can see the arrangement of the very slender *Ironheart* is greatly controlled by the limited beam. Though there are substantial gains to be had in efficiency going this thin—as you can see from the performance tables—you can still gain considerable advantages from even moderately slender hulls. *Imagine* and *Peregrine* are two examples. They have quite comfortable and generally what we think of as “normal” arrangement plans.

In larger boats, it’s easier to work in accommodations in quite slender hulls. The drawings of *Summer Moon II*, show just how comfortable the arrangement can be in an 82-footer, with a length-to-beam ratio of 4.5:1.

**Larger Boats are More Efficient**
In order to keep the boat comparison tables from growing too large and complex, I did not include a normalized *Summer Moon II*. This, however gives us an opportunity to look at another aspect of transport efficiency: Simply being larger makes for greater transport efficiency.

*Summer Moon II* is 82 ft. – 3 in. LOA, 72 ft. – 11 in. DWL, 17 ft. – 0 in. beam, 16 ft. – 3 in. BWL, and 137,400 lb. displacement. This gives a DL ratio of 158 and a length-to-beam ratio of 4.5 on the waterline. Maximum hull speed is 14.6 knots (SL 1.71), driven by a single 720-hp diesel. At 12-knot cruise transport efficiency is 15.5—higher than any of the other normalized boats at any speed. Even if modified to run semiplaning at 16.9 knots, transport efficiency would still be 6.5—again higher than any of the other normalized boats (see table).

This is the reason that larger and larger
cargo ships and tankers are economically attractive. The bigger the vessel the higher the transport efficiency. If we scaled *Summer Moon II* up to 900 feet LOA supertanker size, she would displace 80,500 tons on an 800-foot waterline. Because the waterline is so long, we would only need to drive this supertanker *Summer Moon II* at an SL ratio of 1 because—with such a long waterline—this still gives 28 knots. (Slower is more efficient, and 28 knots is faster than normal for cargo transport.) Power would be around 55,000 hp. The resulting transport efficiency: 289! Yes, simply by scaling *Summer Moon II* up to super giant size.

*Iron Kyle*—45-ft. Tug Yacht

**The Problem with Dockage and Storage Fees**

One of the unfortunate problems with long slender hulls is that almost the entire boating industry charges for boats based on length not on their real size, which is their displacement. If only dockage and storage was calculated based on displacement in tons not length in feet. Using tons, all of our normalized example boats from 45 to 67 feet LOA, would pay the same storage fees. Instead—as things are—the much more economical longer slender boats are penalized by paying higher storage due to their greater length. This is a real shame and something that the boating industry ought to address to encourage more efficient boats.

Tons may be too abstract a number to be
practical. After all, how is a yard to check on the tonnage figure you supply them with? I’ve long proposed that dockage and storage be based on simply 3.5 times beam. For our three example boats (normalized) this would give billable dockage lengths as:

<table>
<thead>
<tr>
<th>BOAT NAME</th>
<th>LOA, ft.</th>
<th>Beam, ft.</th>
<th>3.5-Beam Dockage Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron Kyle (n)</td>
<td>43.42</td>
<td>13.00</td>
<td>45.5</td>
</tr>
<tr>
<td>Imagine (n)</td>
<td>51.17</td>
<td>13.17</td>
<td>46.1</td>
</tr>
<tr>
<td>Peregrine (n)</td>
<td>51.72</td>
<td>14.88</td>
<td>52.1</td>
</tr>
<tr>
<td>Ironheart</td>
<td>67.00</td>
<td>11.00</td>
<td>38.5</td>
</tr>
</tbody>
</table>

I can’t think of any single change in the boating industry that would effectively result in more efficient hulls than this one. If enough people realize that increasing fuel economy is critical to the future of boating, perhaps it will happen. In fact, it could happen if the larger industry associations (NMMA, ABYC, ABBRA, NAMS, Boat/US, SAMS, etc.) all agreed together it was in the best interest of the future of boating and collectively worked for this change.

Jet Drives and Efficiency

Clients often ask me about the efficiency of jet drives. The short answer is that jets are usually (not always) less efficient than propellers. Remember that the larger the propeller diameter and the slower the RPMs the more efficient the propulsion on displacement to semi-planing boats. Jets by their very nature have limited impeller diameter and limited (smallish) intake and outlet diameters. The fundamental laws of physics mean that—at low to moderate speeds—jets will always be at least somewhat less efficient than a properly sized propeller.

As boat speeds increase, the appendage drag of the propeller, shaft, strut, and rudder—the running gear—increases geometrically. Albert Hickman (the inventor of the Hickman Sea Sled and of the surface drive) said, “The resistance of water at 60 knots is the same as the resistance of hard cheese at 3 knots.” He was right. This is why he came up with the surface drive—to reduce the drag from running gear at high speed.

Jets accomplish this same thing. As speeds approach 25 to 30 knots—even though the actual thrust delivered from the jet is less than a comparable prop—the reduced appendage drag compensates. From 25 to 30 knots you will lose some efficiency with properly proportioned jets but not too much. As speed increase over 35 knots, the reduction in appendage drag can make jets net out more efficient than props. This holds up to around 60 knots, where the surface drive is generally more efficient than jets or standard propellers.

Jets offer other advantages: shallow draft and extreme maneuverability. It can make good sense where these to features are primary mission goals to go with jets even in the 22- to 28-knot range. The modest loss in efficiency may be worthwhile. At higher speed there should be little loss, and at high speed an actual gain.

Yachting Magazine May 2011 Features Article on Westlawn Institute

In recognition of eighty years of training successful boat designers, Yachting magazine has run a feature story on Westlawn Institute in its May 2011 issue. Written by Westlawn graduate and Yachting editor at large, Jay Coyle, the story recounts the history of the school and explores the success of its alumni.

“If you are a boat owner, there’s a good chance that a Westlawn graduate had something to do with your boat’s design. The list of alumni reads like a who’s who of yacht design. Graduates of this home study course have played a major role in shaping the sport, and some very dedicated designers have played an important role in shaping Westlawn . . .”

Click HERE to read the full article online.
It’s fairly well known that Gerald Taylor White founded Westlawn in 1930, assisted by his secretary and office manager Eve S. Nelson. Little over a decade later, Robert Miller came aboard as an instructor at the then Westlawn School of Yacht Design and made important contributions to the school and its curriculum.

Robert (Bob) Miller and his twin brother Albert were born in Dolgeville, New York on November 9, 1911. In 1930, Miller enlisted in and served three years with the US Army Band of the 15th Coast Artillery at Fort Kamehamela, Hawaii. He entered the Army playing four instruments: piano, violin, saxophone, and clarinet. Over the next three years, he learned to play the trumpet, slide trombone, bassoon, oboe and Hawaiian guitar. At some point, he also learned to play the organ and mandolin. Because of the return of an old illness, Bob was honorably discharged from the Army, at which time he returned to Utica to organize and led Bob Miller’s Black and Gold Orchestra, which was active in the Utica area for about five years.

Discovering the Westlawn School of Yacht Design (now the Westlawn Institute of Marine Technology), Miller enrolled in the distance-learning course, and completed the basic curriculum in 1939. In August 1941, he graduated from the Westlawn Advanced Yacht Designing Course.

Shortly after completing the basic Westlawn course in 1939, Miller was hired as a naval architect at Wheeler Ship Yard in Brooklyn, New York. He married his wife, Dorothy the same year, and lived in Montville, NJ (where Westlawn was based at the time), until 1942. He returned again to Utica, NY and worked the family farm until 1949. From there, he moved to Toms River, NJ with his wife and three daughters and rejoined the marine industry working at Hubert S. Johnson Boat Works in Bay Head, NJ.

Miller worked as an instructor at Westlawn, and review of his notebooks shows that he created several of the graphs and charts students still find in some of the course.
material. You can see the original version of Skene’s Rudder chart and Keith’s Propeller chart taken from Miller’s original notebooks as two examples. His notebooks are jammed with formulas and references related to boats. Many of these are or were part of the Westlawn course material. It’s also not well known that for a brief period, Westlawn had some traditional, on-site classes in Motville, New Jersey. Miller was one of the primary instructors.

During the 1950s through early 1960s, Miller worked for the naval architecture firm of Thomas D. Bowes Associates located in Philadelphia, PA. From there, Miller became an instructor teaching courses in boat design, drafting, and related math in the Ocean and Monmouth County, NJ, vocational school systems, in addition to doing marine consulting and boat surveys. During this time, Bob continued to work as an independent designer publishing several designs.

In 1972, Miller retired to enjoy sailing in Barnegat Bay, NJ and to devote himself to his lifelong passion of carving. His carving media was mostly a wide variety of woods and exotic wood veneers, but he also carved in ivory, animal bone, and soapstone. His carvings numbered nearly 400 creations, including 4 chess sets and boards, 3 wall murals, 5 coats of arms, plaques, figure heads, birds, animals, flowers, people, figurines, scrimshaw, jewelry, Christmas tree ornaments, and more. His final major carving was that of Leonardo da Vinci’s “Last Supper.” His style was varied, and he often inlaid and integrated the color shadings and textures of different wood species to achieve interesting effects. He also carved items in relief and intaglio. A number of his
carvings were entered into American and Canadian wood-carving competitions and won in their categories.

Robert Miller died October 22, 1987. His boat plans were donated to the Ships Plans Collection at the Mystic Seaport Museum. His marine reference books, Westlawn and SSCD related items, and two carved plaques with logos associated with Westlawn and SSCD were donated to the Westlawn Institute of Marine Technology.

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In 1949, the Society of Small Craft Designers (SSCD) was founded by a group of dedicated small-craft naval architects working with Gerry White, Westlawn’s president. In fact, SSCD was an offshoot of Westlawn, with Gerry White holding the position of SSCD chairman during the early years, and with headquarters in Westlawn’s office. SSCD was very active in arranging frequent meetings of its members and in publishing its regular journal, *The Planimeter*. Robert Miller was one of three members of the Board of Governors of SSCD. During its fifty-plus years of publication, *The Planimeter* featured over 300 articles on boat design, construction and marine technology. A selection of these articles was collected into the book *Problems in Small Boat Design, Selected Papers by Members of The Society of Small Craft Designers*, Sheridan House, New York, NY, 1959.

By 2002—after more than fifty years of successful operation—SSCD had gradually slowed to inactivity. Ownership of SSCD (which had become independent over the years) was returned to Westlawn in 2005, including all SSCD’s intellectual property and the complete library of all back issues of *The Planimeter*. Perhaps most important, *The Masthead* you are reading now is the modern version of the SSCD *Planimeter*. In fact, *The Masthead is The Planimeter*. The name was changed to reflect that the fact that—in this computer age—planimeters are no longer the central tool they once were. The goal of *The Masthead* remains the same; however, to educate and share information and ideas about boats and boat design. This is part of Westlawn’s and its parent company (ABYC’s) mission to enhance and disseminate boating knowledge. *The Masthead* helps fulfill this mission and carries on the fine tradition begun by Gerry White, Bob Miller and SSCD.

The list of SSCD members and *Planimeter* contributors includes dozens of the preeminent names in boat design: Bill Garden, Lindsay Lord, John Kingdon, Thomas Colvin, Sam Rabl, Charles Withholz, John Ammerman, David Martin, Joseph Koelbel, Al Mason, George Meese, Jay Benford, Edward Fry, Arthur Edmunds, Ken Hankinson, David Beach, Daniel Savitsky, Bill Stadel and many more.
Marblehead 22
Designed By Westlawn Alumnus Doug Zurn

Designers Comments:
Zurn Yacht Design, in collaboration with Samoset Boatworks, is pleased to announce the debut of their latest creation, the Marblehead 22 DS—single-line sailing at its finest.

Above the waterline, the Marblehead 22 appears as a true classic: a narrow-beamed hull accented by a plumb stem, sweeping sheer, counter transom and varnished coaming boards. Below the water she's all performance. A fine entry gracefully transitions to a powerful mid-section that finishes with just enough rocker to bring the sea peacefully back together. The low center of gravity and efficient lift of the bulb keel combined with the balanced spade rudder contribute to the Marblehead 22’s ability to effortlessly climb to weather.

The weather deck is open and uncluttered, featuring wide, flat surfaces around the cockpit to comfortably accommodate several crewmembers. Control lines from the North™ mainsail are all led to the middle of the cockpit where either the helmsman or crew can adjust the mainsheet, cunningham or outhaul (a.k.a. “snotter” to wishboom traditionalists). The 45-pound, Hall Spars™ carbon-fiber, un-stayed rig is designed to work in unison with the sail to provide power in the light air, while bending off to open the leach and reduce power in the gusts, keeping the boat at an optimal heel angle for a smooth, comfortable, fast sailing experience. The 11’ 9” of usable cockpit space is nestled between lockers aft and a small cuddy forward for stowing gear.

Speed, stability, and good looks combine to ensure hours of pleasure on the water, by oneself, or with a crowd.

Specifications:
LOA 22’ - 9”
LWL 18’ - 8”
Beam 6’ – 10”
Draft 3’ – 5 ½”
Displacement 2300 lbs
Sail Area 271 ft²
Photos Courtesy of Billy Black
Photography

Doug Zurn
Zurn Yacht Design
Front Street
Marblehead, MA 01945 USA
www.zurnyachts.com
doug@zurnyachts.com
Skype - doug.zurn
Tel - 781-639-0678
Sign Up Now!

Students, alumni and friends,

Join us for the first annual Maine Meet, at the Westlawn office, at The Boat School campus in beautiful Eastport, Maine. This is a wonderful opportunity to meet your instructors and other students, to ask questions, to learn new things, and to just have a good time. Bring your drawings and your questions. Bring your friend, spouse or significant other. Here is the tentative schedule:

**Friday July 22, 2011**
Arrival Welcome to Eastport, Maine, the easternmost city in the U.S.

**Saturday July 23, 2011**
8:30-9:00 Light breakfast and meet & greet in Westlawn office
9:00-9:45 Travelift demonstration
10:00-12:00 Technical seminar
12:00-1:15 Lunch
1:30-3:00 Vacuum infusion demo & tours of The Boat School/Husson University
3:00-5:00 Group-participation, one-on-one critique and review of drawings, questions and answers. Stump the Faculty—ask any questions you can think off. See if you can come up with one we can’t answer.
5:00-6:00 Break
6:00-8:30 Lobster dinner on the beach

**Sunday July 24, 2011**
10:00-1:00 Whale watch with Butch Harris aboard the *Ada C. Lore*

For more information and travel directions, check the Westlawn student forum, and contact Patti Schulte, student services coordinator, pschulte@westlawn.edu to sign up.
Know It All Contest Solution to the March 2011 Question
On the Propeller-Shaft Formula Constant
(This Issue’s Question, Page 17)

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:
The standard formula for propeller shaft diameter in inches, as found in ABYC P-6, in Propeller Handbook, and in Boat Mechanical Systems Handbook, is:

\[ \text{Dia., in.} = 3 \sqrt{\frac{321,000 \times \text{SHP} \times \text{SF}}{\text{St} \times \text{RPM}}} \]

Where:

- SHP = shaft horsepower
- SF = safety factor
- St = shear stress, psi
- RPM = revolutions per minute

Can you explain where the constant 321,000 comes from?

The Winners are:
Naval architect and past contributor to The Masthead, Eric Sponberg, and Elements of Technical Boat Design graduate, Cynthia Cygan both submitted the correct answer to the March 2011 Know It All question. Clearly, each of our winners is too smart for their own good. Indeed, Cynthia is now a two-time Know It All winner—a clear indication of being too smart. In honor of their now proven status as brainiacs, each of our winners is forthwith officially a Know It All, and should henceforth be addressed as such. Naturally, Westlawn T-shirts, caps and Know It All certificates are on their way to both winners.

And the Solution Is:
Over the years, I’ve had many people ask about the constant 321,000 in the shaft-diameter formula. It seems a rather large arbitrary number, as if it was conjured up out of thin air to make the formula work. In fact, the 321,000 is a product of the standard engineering equations for the shear stress in a rotating shaft as developed for the inches, pounds, horsepower, and rpm units commonly used. Here’s how that works out:

Rotating shafts experience shear stress and the maximum shear stress in a shaft is:

\[ \text{St} = \frac{T \times \text{Dia.}}{2J} \]

Or

\[ T = \frac{2J \times \text{St}}{\text{Dia.}} \]

Where:

- St = shear stress, psi

T = torque, pound-inches (lb.in.)
J = polar moment of inertia, in.4

From any standard engineering handbook:

\[ J = \frac{\pi \text{Dia.}^4}{32} \]

Where:

\[ \pi \approx 3.14159 \]

If we know the allowable shear strength of the shaft material we’re going to use, we can find the required diameter based on torque (T) from:

\[ T = \frac{2 \times \text{St} \times \pi \text{Dia.}^4}{32 \times \text{Dia.}} = \frac{\text{St} \times \pi \text{Dia.}^3}{16} \]

So

\[ \text{Dia.}^3 = \frac{16T}{\pi \text{St}} \]

Which gives

\[ \text{Dia.} = \sqrt[3]{\frac{16T}{\pi \text{St}}} \]

This is the standard formula for shaft diameter based on torque. We now need to modify this to find diameter based on power and rpm.

Power is work done per unit time and work is a force times a distance. Velocity gives the distance and time. For a rotating circular shaft the distance per revolution is \( 2\pi r \)—the circumference of the shaft (where r is the radius), so velocity is:

\[ V = 2\pi r \times \text{RPM} \]

Where:

- \( v \) = velocity, in./min.
- \( \pi \approx 3.14159 \)
- \( r \) = radius of the shaft, in.
- RPM = revolutions per minute

Force \( x \) r (radius) = T (torque)

So power is:

\[ \text{Force} \times v = 2\pi \text{RPM} \times T \]

Mechanical power in English units is horsepower, which is 33,000 pound-feet per minute, and we’re dealing with the
power the shaft “sees,” so shaft horsepower (SHP). Our shaft diameter is in inches, so we have to multiply the 33,300 pound-feet per minute by 12 inches per foot to get 396,000 pound-inches per minute. From this we arrive at:

\[ \text{SHP} = \frac{2\pi \text{RPM} \times T}{396,000} \]

Combining the constants gives

\[ \text{SHP} = \frac{\text{RPM} \times T}{63,025} \]

Or

\[ T = \frac{63,025 \times \text{SHP}}{\text{RPM}} \]

We can now substitute this relationship for torque in the diameter-from-torque formula we found earlier:

\[ \text{Dia.} = 3\sqrt[3]{\frac{16T}{\pi ST}} = 3\sqrt[3]{\frac{16 \times 63,025 \times \text{SHP}}{\pi \times ST \times \text{RPM}}} \]

Combining the constants gives

\[ \text{Dia.} = 3\sqrt[3]{\frac{321,000 \times \text{SHP}}{\text{St} \times \text{RPM}}} \]

Here you have the 321,000. It is the result of combining the constants:

\[ \frac{16 \times 63,025}{\pi} = 320,983.7 \]

which rounds to 321,000

We can now insert the safety factor (SF) in the formula:

\[ \text{Dia.} = 3\sqrt[3]{\frac{321,000 \times \text{SHP} \times SF}{\text{St} \times \text{RPM}}} \]

This safety factor (SF) or design coefficient is included to account for wear and damage, manufacturing defects and other unknowns, which will affect the shaft over its operational life. The standard constant for light gasoline pleasure craft is 2, for average yachts is 3, going up to 7.5 for commercial inspected passenger vessels. (See Boat Mechanical Systems Handbook for more details on the safety factor.) Built into these safety factors is a factor of 4/3rds or 1.25 for the reduction in strength caused by the keyway. Larger vessels—using interference fit instead of a keyway—can thus reduce the applicable standard safety factor by subtracting 1.25.

Having followed along this far, you may be wondering—as I have for years—why this particular expression of the shaft diameter formula is the one commonly used. It would simplify the formula still more to extract the 321,000 (really 320,983.7) from inside the cube-root sign, or:

\[ 3\sqrt[3]{\frac{16 \times 63,025}{\pi}} = 68.469, \text{ use 68.5} \]

That would simplify the expression of the shaft-diameter formula to:

\[ \text{Dia.} = 68.5 \times 3\sqrt[3]{\frac{\text{SHP} \times SF}{\text{St} \times \text{RPM}}} \]

It’s exactly the same formula, yielding precisely the same results, but—with the smaller constant—is a bit easier to use. Since simpler formulas reduce the chance of error, I’d recommend that ABYC adopt this simpler expression in the next update of ABYC P-6.
We received several letters regarding the article Hybrids Are Not The Answer, in the March 2011 issue. Here are these interesting exchanges on the subject, which will shed even more light on the question of hybrid propulsion for boats.

Norman Nudelman, Editor

M. Gerr,

I read with interest your article about the inefficiencies of hybrid systems. I must agree that when vessels are driven at their most efficient design speed, with the right propeller and the right gear, it is difficult but not impossible to be better than a new technology diesel.

However, boats are often sailed at the wrong speed, such as in and out of port, waiting for bridges or dock space, to meet certain demands (fast or slow) or in bad weather where the best drag curve has no meaning. The world is not perfect and the best use of hybrid's automation is to optimize the operation of all available resources of electric, batteries and generator to match variable demands. Furthermore, most modern boats have fairly hearty electrical house loads, even if they aren’t cruise ships. The best way to create all that energy, apart from a shore connection, is with a good variable speed, light and highly efficient permanent magnet DC generator. New-technology HVDC generators are 70% more efficient over their lifetime than a fixed-speed AC generator. We are working on optimizing hybrid propulsion for large boats, and our experience is that there are substantial energy savings with a properly designed system. Not to mention the many other benefits of hybrid power, such as reduced noise, no fumes in electric mode when docking, and comfort at anchor where the battery bank provides quiet power.

We would be happy to converse with you on this subject, should you wish.

Best regards,
Pierre

Pierre Caouette
President
ReGen Nautic USA Inc.
www.regennautic.com

Dave Gerr replies:

Pierre:

Thanks for your comments on Hybrids are not the Answer. You present an interesting and valid case for using hybrid propulsion on boats. You are essentially recommending hybrid propulsion for the same off-speed applications where it can make sense on ground vehicles.

Yes, this is a situation in which hybrid propulsion could show some gains. You would have to assume; however, that the boat equipped with such propulsion operated a significant portion of the time at such off speeds to make this worthwhile. That is not very common, though it certainly can be the case on specific vessels. Of course, there are still the loses incurred with changing forms of energy—mechanical to electrical and back; or mechanical to battery/chemical to electrical and back to mechanical.

This also does not take into account the excellent options for conventional non-hybrid propulsion to meet these off-speed operational needs. Controllable-pitch propellers are usually the best way to address regular operation at variable speed and variable loads. Controllable-pitch propellers are very reliable, and—compared to a hybrid propulsion system—inefficient and simple.

The next option—for situations involving protracted operation at low speed—would be a controllable-pitch propeller with a small "loiter" engine that is clutched in to the main shaft, with the high-power main engine decoupled for low speed. Again, there are none of the loses involved in changing forms of energy, and it is still less expensive than most hybrid packages would be.

It’s hard for me to come up with a scenario in which the above two conventional options wouldn’t out perform a hybrid propulsion package in both efficiency and in cost (short term and long term).

In order to really justify the additional cost and complexity of a hybrid system on a boat (even one that operates for long periods at off speed) you would also have to factor in large and variable domestic electric demand. You mention this in your comments. A careful analysis of such a vessel (long periods at off speed and high but variable domestic loads) could well show an overall net gain in efficiency. In my opinion, this would not be common on most boats, however.

Finally, there is the efficiency of cost. This is too often overlooked. Westlawn Institute has a question in one of its advanced systems lessons that asks students to calculate the number of hours a boat with a higher-cost diesel engine would have to operate to make up for/break even with the lower initial cost of a gasoline engine of the same power. The answer surprises most students as it is a very large number of hours. The still greater costs involved in a proper hybrid propulsion package for a boat make the difference in cost between conventional diesel or gasoline look paltry.

What does this high cost of hybrid propulsion mean? It means that—even in those instances where you could demonstrate improved operational efficiency with the hybrid package—you would still have to operate thousands of hours...
to recoup the difference in cost over a standard propulsion
system.

I’d welcome any further thoughts you might have on this,
and would be happy to chat with you on the phone anytime.

Cheers,
Dave

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Dave:

It wasn’t immediately clear to me, did you write the sidebar
on the misperception of hybrid’s efficiency? If so, bravo, I
applaud you. It was spot on.

Sincerely,
Steve D’Antonio
Steve D’Antonio Marine Consulting, Inc.
www.stevedmarineconsulting.com

Dave Gerr replies:

Steve:

Yes, we agree on the lack of efficiency gains from most hy-
brid-propulsion packages on boats. In spite of this, I suspect
we’ll see still more hybrids on boats. There’s a well-
tentioned and understandable desire to be “green.” Since
hybrid technology is accepted as green and cutting-edge on
land vehicles, it’s all too easy for well-intentioned investors
and buyers to be drawn to hybrid for boats.

In fact, the real efficiency gains are from improvement in:
hull form (longer and more slender and lighter); going a bit
slower as a proportion of hull speed; and improving the con-
ventional propulsion-package’s efficiency. Doing all three
yields significant efficiency gains—sometimes very signifi-
cant. This is real "green" propulsion.

Sadly--in the public mind--this sensible, straightforward ap-
proach doesn't appear to have the sex appeal of hybrid pro-
pulsion. Accordingly—even thought the conventional ap-
proach is superior—the real efficiency gains from it don’t
generate the interest and excitement that the new-fangled
hybrid technology offers. This even though the so-called
gains from most hybrid installations on boats are illusory.

Of course, there are specialized vessels that do gain from
hybrid propulsion. I mentioned cruise ships in the article.
Tugs are another good example of special-use vessels that
can and do see real improvements from going diesel/
electric (hybrid). This is because the main engines on tugs
are immensely more powerful than needed to drive the tug
alone. When tugs are running free (without a tow), their con-
ventional engines are dramatically underloaded—inefficient.
By changing to diesel/electric propulsion, tugs can operate
on just one or two of their electric generators while free run-
ing, only switching on all their generating capacity during
power-intensive towing operations.

Cheers,
Dave

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Dave:

Agreed on all points. Then there’s the immense complexity
of most recreational marine hybrids, but that’s another
story.

Sincerely,
Steve D’Antonio
Steve D’Antonio Marine Consulting, Inc.
www.stevedmarineconsulting.com

We Get Mail — Hybrid Propulsion Feedback Continued
2011 Atlantic Hurricane Outlook Summary
NOAA’s Climate Prediction Center is forecasting an above-normal Atlantic hurricane season.

Across the entire Atlantic basin for the six-month season, which begins June 1, the National Oceanic and Atmospheric Administration is predicting 12 to 18 named storms. Six to 10 of them could become hurricanes, with winds of 74 mph or higher, the agency says.

Each of these ranges has a 70 percent likelihood and they indicate that the activity will exceed the seasonal average of 11 named storms, six hurricanes and two major hurricanes.

“The United States was fortunate last year. Winds steered most of the season’s tropical storms and all hurricanes away from our coastlines,” said Jane Lubchenco, under-secretary of commerce for oceans and atmosphere and NOAA administrator, in a statement. “However, we can’t count on luck to get us through this season. We need to be prepared, especially with this above-normal outlook.”

NOAA’s seasonal hurricane outlook does not predict where or when any of these storms could hit. Landfall is dictated by weather patterns when the storm approaches.

Next week is National Hurricane Preparedness Week. To help prepare residents of hurricane-prone areas, NOAA is unveiling a new set of video and audio public service announcements that are available in English and Spanish.

2011 Eastern Pacific Hurricane Outlook Summary
NOAA’s 2011 Eastern Pacific Hurricane Season Outlook indicates a 70% chance of a below-normal season, a 25% chance of a near-normal season, and only a 5% chance of an above normal season. See NOAA definitions of above-, near-, and below-normal seasons. The eastern Pacific hurricane region covers the eastern North Pacific Ocean east of 140°W north of the equator.

This outlook is based on the analysis and prediction of two main climate signals: The ongoing conditions that have been suppressing eastern Pacific hurricane seasons since 1995, and a high likelihood of ENSO-neutral conditions (no El Niño or La Niña) during the peak months (July-September) of the season, but with lingering La Niña impacts perhaps into July.

Climate patterns similar to those expected this year have historically produced a wide range of activity. Allowing for uncertainties, we estimate a 70% chance of occurrence for each of the following ranges of activity this season:

- 9-15 named storms,
- 5-8 hurricanes,
- 1-3 major hurricanes,

An ACE range 45%-105% of the median.

The seasonal activity is expected to fall within these ranges in 7 out of 10 seasons with similar climate conditions and uncertainties to those expected this year. They do not represent the total possible ranges of activity seen in past similar years.

Source: NOAA Press Release May 19,2011

Summer Boating Safety Articles from the U.S. Coast Guard
As we did last summer, the Coast Guard is reaching out to recreational boaters with information about safe boating practices through boating and community publications like yours.

We want to make a measurable difference in the fatality and injury rates from recreational boating accidents, and that means reaching those whose behavior puts themselves and others at risk.

To access articles and photos click on the links below.

- Don’t Roll Your Boat
- Help Keep Our Waterways Secure
- Simple Mistakes, Sudden Complications
- Tracking Time and Tides
- Sudden Flooding
- 10 Factors in Boating Accidents
New "Boating Simulator" Lets You Boat Anytime

**BoatUS Foundation's Virtual Boating Experience is the Next Step in Boater Education**

A new downloadable BoatUS Boating Simulator, provided by the BoatUS Foundation for Boating Safety and Clean Water aims to use animation, simulation and video to keep boaters on the virtual "water" anytime - and teach them how to navigate through congested and sometimes treacherous waters.

The Boating Simulator's interactive boating experience - complete with throttle, shifter and chartplotter - makes learning fun. "Research shows that most people use visual cues when learning and when you combine it with active participation, comprehension and retention increase," said BoatUS Assistant Director of Boating Safety Ted Sensenbrenner. "Simply put, you learn while you're having a great time driving the boat."

The Simulator, which utilizes your keyboard, mouse and arrow keys to operate, is free to download at [www.BoatUS.com/Foundation/games](http://www.BoatUS.com/Foundation/games).

During the game's voyage, players must use all of the tools at their disposal to navigate around aids to navigation as well as shallow water and other vessel traffic. Along the way you could be penalized for violating speed zones, approaching too close to another vessel or navigating out of bounds.

This is the third interactive video game offered by the BoatUS Foundation that puts new or seasoned boaters alike behind the helm of a virtual boat. The first two games, DockIt! and NavigateIt!, teach docking and navigation skills respectively. All BoatUS Foundation games are provided at no cost at [www.BoatUS.com/Foundation/games](http://www.BoatUS.com/Foundation/games) and BoatUS membership is not required to play.

For the Boating Simulator, a standard home PC with Windows XP or newer and a DirectX 9.0 compatible video card is required. Simply follow the on-screen instructions and prompts to download to your computer. [www.BoatUS.com/foundation](http://www.BoatUS.com/foundation).

Who Will Be The June 2011 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.

Kevin Ritz, president of Cruising Essentials and ABYC west coast representative sent in this conundrum:

A fleet of well-made aluminum boats—working in fresh, brackish and saltwater—virtually all experienced the same corrosion around the windows in the trunk cabin side. An example is in the photo at the right.

Can you explain the cause of the corrosion?
After watching the Wednesday night sailboat races with my family a few weeks ago, a sturdy-looking motorsailer steamed past us. It was dusk, and the disbanding racers and boaters were using their navigation lights. As the motorsailer turned into the wind to wait for the drawbridge to rise, my dad mentioned the boat’s stern light was out. The boat continued to rotate and we saw a flash of the stern light when his davit-mounted dinghy swung just enough to reveal the small-but vital-signaling device.

Certainly if the owner added the davits, the owner is responsible for recognizing the navigation light is now obstructed and he needs to relocate the lamp. Following the requirements in the 72 COLREGS and ABYC’s A-16, with few exceptions, navigation lights shall not be obstructed throughout their arcs of visibility. What’s the big deal with blocking a little light? After all it’s considered acceptable in North America to mount a bicycle rack on the trunk of a car and obscure the tail lamps and license plate. Why not on a boat? Should something go wrong, like a speeding powerboat running over a slower boat whose stern light is not visible, the slower boat could be at fault.

What does this mean for boat designers and builders? No you are not expected to predict all future owners’ modifications to your design and construction. The aftermarket radar, spotlight, bimini, swim platform, dinghy, solar panels, flags, horns, and anchors are inevitable. Recognizing trends during the design and procurement phase can reduce the need for additional rework when owners personalize their boats.

Similar to the automotive industry prior to World War II, sourcing navigation lights involves opening a catalogue and buying off the shelf. Knowing this, boat designers and builders should provide a location to mount the navigation lights. A flat pad parallel to the static waterline, the long axis of the boat, or both will cover side and masthead lights. A vertical pad athwartships should be included on the stern or pushpit for stern lights. Masthead and allround lights on arches or hardtops should give extra height to clear future additions and avoid fold-down designs that are commonly left at a raked angle. While this minutia may seem unnecessary, consider the distances involved. Navigation lights for pleasure craft can exceed a visibility of three nautical miles. If a sharpshooter’s rifle was off by seven degrees, would he hit his target? Making matters worse, boats are dynamic in nature and when underway even the best intentions for mounting can be compromised. The standards account for this provided the lamp is mounted correctly. Furthermore, due to the heeling of sailboats, they have unique requirements for vertical sector intensity as in A-16, Figure 7.

Email: dcasali@abycinc.org
MLC Labor Pains
Or How the United Nations Will Affect Yacht Design

The Maritime Labor Convention (MLC) 2006 sought to bring fairness and decent conditions for merchant mariners, so why is it the 800-pound gorilla in the room for yacht owners and designers?

By Dudley Dawson

Yacht owners may not yet have heard of the Maritime Labor Convention 2006 (MLC), but it will soon become the most important element on their agenda. At 110 pages, it is the most comprehensive maritime labor treaty ever proposed.

It is likely that the MLC will be ratified within 2011 and come into effect 12 months later. Its impact on the design, construction and operation of yachts will reach beyond that of all prior regulations. The convention will affect decisions regarding yacht size and type—as well as cruising venues—for many yachtmen in the years to come and is already being considered by designers and builders in projects on the boards.

While most in the industry are familiar with the International Maritime Organization (IMO), fewer are aware of the International Labour Organization (ILO) and its activities. Both are agencies of the United Nations, but they differ dramatically in purpose and composition. Members of IMO include representatives of government, shipbuilders, ship owners, and other organizations with seafaring interests. The U.S. Coast Guard, for instance, is a full voting member. The Superyacht Builders' Association (SYBAss), on the other hand, is a consultative member only, with the right to attend and comment in sessions, but without voting rights. The work of the IMO occasionally touches on matters related to the welfare of seafarers, but is primarily focused on safety and on ships themselves.

The ILO, on the other hand, is composed primarily of representatives from governments and labor organizations around the globe, including unions. In the past, its work has mostly related to land-based workers, but in 2001, planning began
on a new treaty to address the welfare of professional seafarers. By intent, it was a tripartite effort, including ship owners, seafarers, and governments. Unfortunately, the ship owners’ groups did not include anyone representing the interests of yacht owners.

Ship owners sought to level the playing field, particularly the better ship owners tired of competing with those who operated sub-standard ships with sub-standard crews and cheap prices. Seafarer organizations (crew organizations) had an interest in seeing the working conditions of their members improved. Governments, the ones interpreting and enforcing the treaty, also wanted a hand in the planning. No one thought of yachts.

Five years of deliberation yielded the final draft of the MLC in 2006. It will become an international treaty once it is ratified by the required number of nations (30) plus the requirement those countries flag at least 33 percent of the world gross tonnage. Ratification is well under way; with the first 11 signatories, the tonnage requirement is already met. Predictions are there will be 19 additional signatories by the end of 2011. At that point, the clock begins counting down the 12 months until the MLC enters into force for all ILO member countries, including those who have not ratified it and those who have voted against it. In the meantime, it cannot be modified or amended.

The convention will apply to “commercial” vessels over 200 gross tons, as well as to vessels under 200 tons but over 24 meters (79 feet) in length. For purposes of the convention, charter yachts are included in the commercial category, just as they are in the MCA Code. The difference, unfortunately, is that yachts were never considered as a separate category during drafting of the MLC. In fact, the word “yacht” does not appear. Whether by oversight or disregard, the result is the same: Yachts in the charter trade will be subject to the same requirements as commercial cargo ships and tankers when it comes to crew welfare.

MLC details will be subject to interpretation, but it will not be simple. Guidelines issued by ILO in conjunction with the document itself run 88 pages for flag states—those nations in which the vessels are registered—and another 90 pages for port states, those nations who will be enforcing the provisions when vessels enter their ports. There are exemptions from certain of the requirements based on equivalencies, but port states are not initially bound by decisions of flag states. That raises the specter of a yacht having all its paperwork in order and yet still being detained during a voyage. It will all likely be worked out over the long haul, but the potential for disruption of charters in the interim is unavoidable. Guidelines for port state enforcement, in fact, include a section on “action to be taken if the ship is not allowed to sail.”

So what is the intent of the MLC and what does it cover? The preamble states the desire “to create a single instrument embodying as far as possible all up-to-date standards of existing international maritime labor Conventions and Recommendations, as well as the fundamental principles to be found in other international labor Conventions.” While the first part appears relatively benign, it hides a problem, that is, the con-
MLC Labor Pains  Continued . . .

Attention that some existing rules have been ignored by the maritime industry and that authorities have looked the other way with regard to enforcement.

The second part of the statement hints at what is to come in the details of the MLC’s text. The result is the imposition of many shoreside labor standards, some sensible and warranted, other arguably excessive or unnecessary. In the first example, the provisions of Article III, FundamentalRights and Principles, include:

1. Freedom of association and the effective recognition of the right to collective bargaining
2. The elimination of all forms of forced or compulsory labor
3. The effective abolition of child labor
4. The elimination of discrimination in respect of employment and occupation

No one would oppose the abolition of forced or child labor, but for most, collective bargaining will be a new wrinkle in the business of running a charter yacht. While the elimination of discrimination is commendable in general, the details of the MLC get into such areas as employment registries and preference for seniority. It does not allow for the distinctive aspects of yachting, an activity more about personal service, comfort and a client’s particular wishes than it is about running a ship. Some discrimination regarding the selection of personnel deemed suitable for the tasks at hand seems necessary.

Further evidence of what is coming is contained in the provisions of Article IV, Seafarers’ Employment and Social Rights:

1. Every seafarer has the right to a safe and secure workplace that complies with safety standards
2. Every seafarer has a right to fair terms of employment
3. Every seafarer has a right to decent working and living conditions on board ship
4. Every seafarer has a right to health protection, medical care, welfare measures and other forms of social protection

Again, these provisions are hard to dispute in principle, yet the detailed implementation of those provisions will affect yachtsmen. These details are contained in the Regulations and the Code. Within this section are five Titles:

| Title 1 | Minimum requirements for seafarers to work on a ship |
| Title 2 | Conditions of employment |
| Title 3 | Accommodation, recreational facilities, food and catering |
| Title 4 | Health protection, medical care, welfare and social security protection |
| Title 5 | Compliance and enforcement |

These include a number of areas regarding the manning and operation of vessels and care of their crews. The more progressive owners will see little change, while others may need to make significant adjustments in their operations. Provisions include:

- Regulation of manning standards, and crew training and qualifications
- Regulation of hours of work and off-duty, including mandatory payment for overtime and provision for a “weekly day of rest”
- Access to free employment services and regulation of crew recruitment services, as well as unemployment benefits
- Requirement for standardized employment agreements
- Establishment of minimum wage levels and standardization of wage payment procedures
- Requirements for shore leave, annual leave (minimum 30 days per year), and provision for “partners, relatives and friends” to visit crew aboard while in port
- Inspection by port authorities of “stores and services provided”

As significant as these requirements might be to yacht owners, Title 3, relating to vessel design, that is receiving the most attention. SYBAss empanelled a group of their designer/builder members to look into the consequences of the MLC for new yachts, those with keels laid after the convention enters into force. MLC will address in detail:

- minimum sizes for crew cabin floor area, with very strict limits on exemptions for yachts under 200

SYBAss studied 20 motoryachts and sailing yachts ranging from 200 to 3,000 GR (the size range of LY2). All yacht designs compared the existing layouts to MLC complaint layouts. Without taking into consideration the equivalencies being proposed to amend the Convention after ratification. MLC has a diminishing impact on motoryachts above 1,250 GRT and sailing yachts above 1,000 GT, but will still result in an increase in mandated crew area.

“It seems that designers don’t understand what was written. The problem is nearly solved according to MCA’s TWG 95. Including TWG 95, the extra cost to make a yacht compliant can be less than one percent of the total value”

—Theo Hooning, Secretary General, SYBAss

Requirements as to food services and medical care aboard, as well as the certification of those providing those services, including minimum sea time for chefs

Food service must “take into account the differing cultural and religious backgrounds”
**MLC Labor Pains Continued...**

- gross tons
- minimum outfitting for crew cabins, including provision for wash basins, and number and size of lockers and drawers
- upper bunks are prohibited in some cases
- requirements regarding color and surface textures for materials in crew accommodations
- requirement for single berth crew cabins, with exemptions possible but not assured for yachts under 3,000 gross tons
- minimum sizes for bunks and heads
- restrictions on shared heads, with separate facilities for men and women required in some cases
- requirements for light and natural ventilation, as well as climate control
- minimum size, equipment and outfitting requirements for crew mess, head, laundry and recreation areas
- provision for a crew-only off-duty recreation area on an exterior deck
- “consideration should be given to including,” among a list of 10 items for the crew, a bar, a library, and a swimming pool for their use
- provision for dedicated hospital space on yachts carrying 15 or more crew on voyages of more than 3 days, and for medical equipment and other minimums on smaller yachts
- approval of materials used in construction and outfitting

Chris van Hooren, technical and environmental director of SYBAss, reported recently on the group’s conclusions about the likely impact. The effects, understandably, were more drastic for smaller yachts and less so for larger yachts. At 500 gross tons, motor yachts would require an increase of about 50 percent in crew accommodation volume. Existing yacht designs in that size range would thus lose about 40 percent of their guest accommodation space. For sailing yachts, the results were even worse, with a corresponding loss of over 60 percent of the guest accommodation.

To mitigate the dramatic effect on the sale of both new and brokerage yachts in the next few years, SYBAss and the International Council of Marine Industry Associations (ICOMIA) have developed an alternate proposal for consideration by ILO. It proposes compromise “equivalencies” that, while improving on the status quo and requiring some upgrades, will have much less impact on yacht design.

The MCA notes, “it may be very difficult for yachts in the 200gt to 500gt bracket to comply with the full crew accommodation provisions,” and “is working with representatives from the sector and social partners to agree a revised version of Chapter 21 of the Large Yacht Code, which meets the objectives, of MLC 2006, but recognizes the particular constraints on this sector.”

The process of amending the MLC, however, is cumbersome and will, even in the best of circumstances, be slow. As a result, yacht owners will find it necessary to live within the convention’s terms for the foreseeable future. Those eyeing yachts at the upper end of the spectrum, will simply adapt and order yachts that are a few meters longer. Some, will scramble to start the construction of their new yachts before the convention enters into force. Others will take the opposite tack, keeping their yachts under the size limit that would trigger regulation. Still others will confine their shopping to existing yachts, and finally, some may forego the charter opportunity, keeping initial costs lower but sacrificing resale value in the bargain.

Some flagging registries and classification societies are already gearing up to help owners with these decisions. The Marshall Islands, for example is proposing to exempt yachts in commercial service less than half of the year, but other flag states might not recognize that exemption. Owners would be wise to seek advice from professionals on any decisions that could be affected by the convention.

**Sources for further information:**
- International Labour Organization, [www.iolo.org](http://www.iolo.org), including full Convention and Guideline text online
- SYBAss, [www.sybass.org](http://www.sybass.org)

Reprinted courtesy of ShowBoats International

A licensed professional engineer with a degree in naval architecture and marine engineering from Webb Institute, Dudley Dawson is president of Dawson Marine Group, a marine design and consulting firm based in Roxboro, North Carolina. Dudley served as a U.S. Coast Guard officer for nine years and his personal design portfolio includes powerboats, motoryachts, sportfishing boats and commercial ships up to 625 feet in length. Dudley was a designer and vice president with J. B. Hargrave Naval Architects for thirteen years, and was chief naval architect of Hatteras Yachts for six years.

He serves as technical editor of Yachting magazine, where he concentrates on coverage of motoryachts and everything associated with them. Dudley also writes feature articles on marine design and construction for Professional BoatBuilder magazine as a contributing editor, and is a regular contributor to Southern Boating, ShowBoats International and Boat International magazines.
When the keel was first laid, the Great War was a distant rumble a long, long way away. By the time the frames were lofted and sawn, the winter had closed in and she would have the cold on her bones until spring and her planks would complete her shape. It was late fall 1911 when the ways were greased and she slid into a ripple free Oyster Bay.

*Ida May* was purpose-built as an oyster dredger. She was a 30-year workboat with lines that evolved from the sailing dredgers and an attitude grown from the year-round Oystermen whose tolerance for biting icy gales is as great as that for scorching New York summers.

Fitted with a massive 48-hp, 6-cylinder, in-line diesel, she was one of a growing number of powered working vessels on Long Island Sound, and was described as something of a wonder even in that late day. Her twin drum donkey winch, which ran from a single power take-off on her diesel, was a later installation, but this allowed her crew to handle up to 18 tons of oysters and clams per day.

Power dredging is a simple dragging of a steel rake some 4 feet across along the sand and mud of the seabed. The rake is flown like a kite on tethers run from booms (port and starboard) and supported by a short, stout pyramid-stayed mast. The rake digs itself into the bottom, as we would want a good anchor to. It is overpowered by the boat's motor and, just as we would not wish a good anchor to do, it drags. The rake tows a chainmail bag which allows the sand and silt to pass through, but larger items like oysters, clams and rocks are collected.

When the skipper decides he has collected enough weight in the dredge, it is hoisted aboard and the contents are spilled out on deck for sorting and cleaning. A huge weight of shells and rock could be accumulated on the deck during a day's work.

As large areas of the bays are shallow, and some of the highest yielding areas are very shallow, *Ida*'s hull had to be able to float in 3 feet of water or less. More importantly, she had to be able to load up and still get through the shallows and back to the landing dock. These attributes were achieved by a very large beam and a massive internal keel. The keel was molded vertically almost two feet thick and sided a foot wide, but only five inches of it protruded from below her garboard to find and nudge wayward rocks aside as she headed back to deep water.
The Masthead

Needless to say, with the need for shallow running, the prop was protected by an iron rudder skeg. Even with this protection, we know the prop was replaced several times during the past hundred years. It was even replaced for an iron wheel during a drive for copper during World War II, when she had already surpassed her anticipated 30-year service life.

Life on Oyster Bay is slow and measured by the ice melt and the bluefish shoals, the migrant geese, and the colors of the autumn foliage. For an oyster boat, as long as there is liquid water there is work to be done. She will be hauled for a scrub down and maintenance to coincide with the arrival of the ice sheets in early January. A re-caulk and paint on the topsides might be a five year treat.

And so, under the ownership of the Frank M. Flowers Co., Ida May fished her years, landed countless tons and millions of shellfish, and day by day, season by season, and year by year without anyone noticing she plodded her way from the past to become a “Vessel Of Historical Significance”.

Ida May Original Lines

Lines of the New Ida May
Ida May Original and New Deck-Height Comparison Study

New Ida May Profile & Deck
Because of our involvement with the sailing oyster sloop Christeen, McCurdy & Rhodes Naval Architects were asked by the Waterfront Center to guide the restoration of Ida May. At this time in late 2007, she had been placed on the hard for over a year and was no longer fishing. Great gaps bore witness to her dried timbers and her massive keel sagged under the insufficiently supported hull. An immense split along her gunnel was ominous, and closer inspection showed the deck and topsides were going their separate ways.

I watched as the sages shook their heads and came to the conclusion: “She can’t be saved.” I thought I would not hear anything more about Ida May. My assumption was she would be cut up and fade away as so many marine aspirations do. So you can imagine my surprise when Ian McCurdy called one day and asked me if I would like to build a new Ida May.

The plan was hatched to build a working oyster dredger in type but not in function. Just like the Christeen, she would be primarily a passenger vessel and her mission would be to allow school-age students and adults to experience the life of an oysterman for short trips on her home waters. The new Ida May was to look as close to the original as was possible while complying with the regulations to take passengers, be used as a lecture platform, and earn her keep as occasional charter vessel.

A requirement for some funding from New York State was the provision of full working documentation drawings for the original vessel as built. This involved an odd, semi-destructive survey of the original boat, while measuring the scantlings and noting construction methods as well as materials used. The final part of the survey was to generate a full set of offsets from which a lines plan could be drawn.

Back at the office I set about producing the lines and construction drawings as well as the detail drawings for some of the more unusual joinery. When I had the first set of lines drawn, I could see some very unfair curves which went somewhat against the grain. So I went back to Ida and took another set of offsets from the starboard side. I averaged the offsets and redrew the lines plan. This time they turned out a bit better, but still showed some ugly curves. It was decided that the keel sag was responsible for some of the shape distortion and so her lines we amended once more to give a better reflection of how she looked when new. We arrived at the correct changes by interpolating the keel sag to the sheer for all points in between.
The Masthead

The Rebirth of “Ida May” (continued)

With a completely new design, you don’t always have a blank page. The owner may have very strong ideas about how things should be done or what the boat should look like, and Ida May was no different. The new Ida is to take passengers, and have the kind of accommodation that would never be found on an original oyster boat. There were discussions of hybrid electric diesel drive, wheelchair accessible heads, offshore capability and lecture room. This list of aspirations went through the design spiral many times; they were chopped and changed, mangled and twisted and handed back for interpretation by the designer.

The two points that were agreed from the beginning were the finished boat, was to pass Coast Guard approval as a passenger vessel and resemble as closely as possible, the original Ida May. These points had to be addressed from outset of design. The most apparent problem was the super sheer would have to rise,” I explained to a general chairman of the Coast Guard.

The coamings on the hatches are raised to 18 inches high to allow people to sit out of the weather.

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“The sheer would have to rise,” I explained to a general chairman of the Coast Guard.

I worked up a new set of lines, fairing out some of her ugly wave-making curves. A particularly odd aspect of the original was the strange shape of the forefoot. It was explained to me that the builders simply used the wood that was available to them rather than waiting for the perfectly shaped piece. It looked cut back at an angle like the forefoot of an icebreaker. To this day I have my doubts whether this angle was deliberate and intended. Although there may have been merit in having an ice breaking ability, it distorted the hull lines badly.

By raising the sheer 18 inches and leaving the fore and aft bulwarks descending only as a façade past the sheer and then only raising the massive 8 inch diameter half round rubbing streak by 6 inches we kept the general appearance close to original. She now looked more like a seaboat to my eye, and the hydrostatics and stability calcs proved it.

Internal changes were fun to work out. Her motor was to be fitted under the main hatch rather than under the wheelhouse, much to the delight of her new engineer elect. The space under the house will have a head, a useable bunk space, and the electrics panel as well as space for up to 10 people to sit out of the weather.

The coamings on the hatches are raised to 18 inches high to double as seating and storage for life jackets. Transverse bulkheads are located at the winch Sampson post, at the forward end of the deckhouse and at the aft end of the house. Tanks are located far outboard and they are easily replaced cylindrical steel. These are chocked in against the huge deck knees and almost fit to the hull without being specifically shaped for the hull.

At this time, the felled trees that will be swan to ribs and beams are seasoning and the keel baulk has been chosen and rough cut. I am happy to say we did not have to use whatever timbers we might have had on hand this time, nor did we have to wait too long for the perfectly grained forefoot and stem. My expectations are very high for the new Ida May, and maybe—with a good skipper and a five yearly top-side and bottom treat—she might just outlive her namesake.

The Lighter Side . . .

Scientific Conversions?

01. Ratio of an igloo’s circumference to its diameter = Eskimo Pi
02. 2000 pounds of Chinese soup = Won ton
03. 1 millionth of a mouthwash = 1 microscope
04. Time between slipping on a peel and smacking the pavement = 1 bananosecond
05. Weight an evangelist carries with God = 1 billigram
06. Time it takes to sail 220 yards at 1 nautical mile per hour = Knotfurlong
07. 16.5 feet in the Twilight Zone = 1 Rod Sterling
08. Half of a large intestine = 1 semicolon
09. 1,000,000 aches = 1 megahurtz
10. Basic unit of laryngitis = 1 hoarsepower
11. Shortest distance between two jokes = A straight line
12. 453.6 graham crackers = 1 pound cake
13. 1 million-million microphones = 1 megaphone
14. 2 million bicycles = 2 megacycles
15. 365.25 days = 1 unicycle
16. 2000 mockingbirds = 2 kilomockingbirds
17. 52 cards = 1 decarcards
18. 1 kilogram of falling figs = 1 FigNewton
19. 1000 milliliters of wet socks = 1 literhosen
20. 1 millionth of a fish = 1 microfiche
21. 1 trillion pins = 1 terrapin
22. 10 rations = 1 decoration
23. 100 rations = 1 C-ration
24. 2 monograms = 1 diagram
25. 4 nickels = 2 paradigms
26. 2.4 statute miles of intravenous surgical tubing at Yale University Hospital = 1 IV League
27. 100 Senators = Not 1 decision

With thanks (we think) to Jay Jeffries
One of the foremost boat designers of the twentieth century left us on April 29, 2011, at the age of 92. He reportedly died near Sidney, B.C. In a career that spanned over six decades, Garden penned more than 650 designs, including both production and custom boats. His wide-ranging work encompassed yacht and commercial projects, and such production vessels as the Formosa 51 and the Mariner 36, to name two of many.

Born in Calgary, Alberta Canada on November 18, 1918, his family moved to Oregon in 1924. Garden started school in Oregon, but the family returned to the Montlake District of Seattle in 1928. Garden graduated high school there and studied boatbuilding at Edson Technical School, which later became the Seattle Central Community College. He then started work at Andrew’s Boat Company on Portage Bay, in Seattle. By his 24th birthday, he had drawn more than fifty boats. He had also drawn and built his own schooner Gleam, which he cruised throughout the Vancouver Island, San Juan Islands and British Columbia region.

Garden formed a boatbuilding partnership with Dave Leclercq, based at an old mill on Portage Bay, where they constructed five boats, but closed shop in 1942 to work at larger yards building vessels for the war. Later that year, he was drafted by the U.S. Army and assigned to the Adak Ship Repair Base, in the Aleutian Islands. After discharge from the army in 1946, Garden returned home, put Gleam back in shape and designed halibut boats, trollers and the 30-foot cutter Bull Frog. One of Garden’s cruises on Gleam, was documented in an article in the April 1951 issue of Yachting, “Beachcombing the Goose Islands.”

A Bill-Garden perspective drawing. This was his own boat, Oceanus. From Yacht Designs, by Bill Garden, Courtesy International Marine/McGraw-Hill
Garden didn’t attend college and was grandfathered into his naval architecture P.E. license. It’s proof positive that this can be done and should be done, as perhaps the best naval architect of the twentieth century came up this way.

In 1951 Garden moved his office from the old boat shop site on Portage Bay to the Pacific Fishing & Trading Co. building on the ship canal in Ballard; then in 1954 the office was moved to Maritime Shipyards with a participating interest in the yard. This partnership produced several yachts, workboats, pile drivers, and more. Garden and naval architect Phil Brinck worked together on miscellaneous projects through the mid 50’s, and in 1956 Brinton Sprague—a mechanical engineer and Bill’s good friend and mentor—joined him for several years, his expertise providing a major contribution to the firm. A 1957 article in Marine Digest detailed 62 boats in construction valued at nearly 2 million dollars and another 12 on the boards.

In 1959, the design office was moved from the Maritime Shipyards location to a new building above Lockhaven Marina overlooking the locks and ship canal traffic. For a time, Garden gave serious thought to relocating to New Zealand in order to provide a more ideal location to raise a family, and Victoria, BC was chosen in 1968 as an interim move while projects in process were completed. Later, a nearby island was purchased as an interesting location for design offices. Shops and a self-sufficient island home were built in 1969, and from then on Garden operated from this location. He named his island base Toad's Landing.

Garden's magazine articles and two design books are an inspiration and source of awe for designers around the world. *Yacht Designs* and *Yacht Designs II*, both originally published by International Marine, are filled with beautiful designs, power and sail. The drawings are not only exquisite, exact, and technically excellent, but are filled with delightful quirky little details, like seamen in hats holding paint buckets. His hand-drawn hull perspectives are a joy, and would be hard to equal for their combination of clarity, accuracy and warmth by any modern computer 3D program.

Boat designer Bob Perry spent some time with Garden and remembers words of simple common sense. He once asked Garden what he did about rudder flutter? Garden replied, “If the rudder has a radiused trailing edge, flatten it. If the rudder has a flat trailing edge, radius it.” On another occasion, Garden grumbled to Perry, “Never guarantee performance in writing.”

Bill Garden’s complete plans and records are available for study at Mystic Seaport Museum’s Ships Plans Collections. I have spent many hours poring over Garden’s brilliantly detailed drawings there. I learn something new every time I do.

The world of boats is an incalculably richer place thanks to Garden’s extraordinary work. We wish him Godspeed on his final passage.

— D. Gerr

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Sources: Mystic Seaport, Robert Perry’s “Bill Garden: A Memoir,” Jay Benford and Tiller Publications, *Yacht Designs* and *Yacht Designs II*, International Marine/McGraw-Hill
The Yachts and Ships of Jack Hargrave
By Marilyn Mower

Jack Hargrave
The man who put America on the water!
More than 300 designs.
More than 7,000 boats and ships.

What Nat Herreshoff and the Stephens brothers are to sailing, Jack Hargrave is to the world of motor yachts—and then some! Hargrave’s genius lay in his ability to design every type of vessel and achieve success with any construction material. In 1959, he revolutionized the boating industry with the world’s first fiberglass convertible sportfisherman. In 1960, he rocked the world again with the first all-aluminum luxury yacht. In just 38 years, Jack Hargrave and his team of designers, engineers and draftsmen drew the lines that launched 7,000 yachts and ships: no other designer comes close and it is unlikely any other independent yacht designer ever will. A quiet man of great humility, Hargrave’s talent allowed him to conceive vessels as dissimilar as a 19-foot runabout, offshore racing boats, stern wheelers, military patrol boats, thousands of elegant yachts, and even a 691-foot integrated tug-barge.

With Don Mucklow, Willis Slane, Dave Parker and a cast of Carolina boatbuilders – Hargrave created the greatest brand production boatbuilding has ever known – Hatteras Yachts. Hargrave’s ideas and style redefined America’s power boat industry and his ideas about solid, seakindly boats took root at 65 yards in 21 countries.

Jack Hargrave – the dean of American naval architecture – was a man of intriguing contrasts. Although he designed yachts for the world’s elite, he never forgot his Midwest values, brown-bagged his lunches and hated the term megayacht.

American Classic—The Yachts and Ships of Jack Hargrave introduces the reader to a true American success story and in so doing traces the richest chapter in the development of boating and commercial shipping the world has ever known.

224 pages, 334 photos, 75 yacht design profiles
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ABYC SPRING & SUMMER WEBINAR SCHEDULE

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Date: Wednesday, June 22, 2011 Time: 1:00 PM Location: Online in your home or at your office desk!
Information: http://www.abycinc.org/calendar/eventDetails.cfm?eventID=451 $49
ABYC Members $99 Non-Members (click here) Register Online!

--WEBINAR-- Joe Derie, "Introduction to Marine Accident Investigation"
Date: Thursday, July 7, 2011 Time: 1:00 PM Location: Online in your home or at your office desk!
Information: http://www.abycinc.org/calendar/eventDetails.cfm?eventID=465 $49
ABYC Members $99 Non-Members (click here) Register Online!

--WEBINAR-- with Ed Sherman, Using A TDR to Trace On Board Electrical Faults
Date: July 20, 2011 Time: 1:00 PM Online in your home or at your office desk!
Information: http://www.abycinc.org/calendar/eventDetails.cfm?eventID=464 $49
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Continued on page 35
Essential Continuing Education
For Marine Surveyors, Boatbuilders, Managers and Small-Craft Designers

Elements of Technical Boat Design (Course No: ETD)

Elements is a comprehensive introduction to the fundamental concepts in yacht and boat design for marine professionals. Note: Graduates of Elements may transfer to continue on and complete the full professional Westlawn Yacht & Boat Design Program, receiving credit for all the subjects passed in the Elements course.


CLICK HERE for a detailed syllabus
CLICK HERE for more details and enrollment information on this and other Westlawn essential continuing education courses

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This comprehensive distance-learning course provides instruction in the fundamental concepts of sound fiberglass boat construction practices and structural calculations.

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NOTE: This course consists of lessons excerpted from Westlawn’s larger Elements of Technical Boat Design course and also in the full Yacht & Boat Design Program. On completion of BC 401, students may transfer into either program and receive full credit.

CLICK HERE for a detailed syllabus
CLICK HERE for more details and enrollment information on this and other Westlawn essential continuing education courses

ABYC Courses and Schedule for 2011

The ABYC education department has been providing industry certifications, training, high school and college curriculum, and industry seminars for over twenty years. They are providing the marine industry with the skilled workers required to build and maintain modern small craft of all types.

ABYC is currently scheduling on-site factory training for 2011. Please call ABYC for custom tailored, flat rate, instruction by top industry trainers at your facility (410-990-4460, Ext. 31).

The Marine Technician Certification Program developed by ABYC with "NOCTI Certification"* has proven to be the industry standard. ABYC continues to provide the highest quality marine education and training throughout the country and throughout the year.

For course dates and descriptions Click Here

*NOCTI (National Occupational Competency Testing Institute) is a regular provider of the assessments on which many certifying bodies depend for measures of applicants’ standards-based knowledge and skills. Certificates benefit employers by showing that applicants have acquired specific skills. The status of having a certified staff can lead to higher sales and customer satisfaction.
The Masthead

Training Links & Event Schedules (continued)

2011 Events Program

RINA organizes a programme of international conferences, workshops and training courses, covering a broad range of experience and opinion on research, development and operation on all aspects of naval architecture and maritime technology. For more information about any event, click on a title.

Design & Operation of Tankers
8-9 June 2011, Athens, Greece  REGISTER NOW

Warships 2011: Naval Submarines & UUVs
29-30 June 2011, Bath, UK  REGISTER NOW

The 4th Conference on Technology and Operations of Offshore Support Vessels
16-17 August 2011, Singapore  CALL FOR PAPERS

The International Conference on Marine Design
14-15 September 2011, Coventry, UK  CALL FOR PAPERS

International Conference on Computer Applications in Shipbuilding
20-22 September 2011, Trieste, Italy  REGISTER NOW

Basic Dry Dock Australia
11-14 October 2011, Melbourne  REGISTER NOW

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Information:  [http://www.abycinc.org/calendar/eventDetails.cfm?eventID=467](http://www.abycinc.org/calendar/eventDetails.cfm?eventID=467)  $49.00 ABYC Members $99 Non-Members  (click here) [Register Online!](http://www.abycinc.org/calendar/eventDetails.cfm?eventID=467)

Info: Sandy Brown
Email: sbrown@abycinc.org
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**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
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There are over 8,000 subscribers to *The Masthead*, Westlawn Institute’s quarterly E-journal. Our readers are yacht and boat designers, boatbuilders, marine techs, surveyors, boat design students, and members of the boating public.

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**Who We Are**

Westlawn is a not-for-profit educational affiliate of the American Boat and Yacht Council (ABYC). Our school is nationally accredited by the Distance Education and Training Council (DETC), and is listed as an accredited school by the U.S. Department of Education and by the Council for Higher Education Accreditation. The Westlawn Yacht & Boat Design Program is also accredited by the Royal Institution of Naval Architects (RINA).

**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.
- 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.