



The Masthead

News from Westlawn Institute of Marine Technology

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Welcome

Dear Students, Alumni, and Friends,

As indicated by various industry sources, and as reported on Page 8, the shortage of trained boat and yacht designers and marine industry technicians has become critical. Now is the time to plan your future and get the education needed to upgrade or launch your career.

Students in Europe have a further incentive. With the Euro so strong against the dollar, EU students realize a 30% to 40% discount on Westlawn tuition.

Norm

Norman Nudelman, Editor
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The 2008 Inductees to the North American Boat Designers Hall of Fame

The legendary boat designers, **Jack B. Hargrave** (1922–1996) and **Dick Newick** are this year's inductees to the North American Boat Designers Hall of Fame. The announcement was made by nominating committee spokesman, Dave Gerr, at the ABYC annual meeting in Miami Beach, FL. On February 13, 2008. Sponsored by Mystic Seaport – *The Museum of America and the Sea*, ABYC, The Landing School, and the Westlawn Institute of Marine Technology, the NABD Hall of Fame was created to permanently recognize achievements by leading designers who have demonstrated exceptional long-term and important contributions to the art and science of boat design. The hall will be housed at Mystic Seaport where a crystal engraved plate will be on display to commemorate each inductee along with photos, drawings and historical reference material.

Jack Hargrave

There's no question that Jack Hargrave was the preeminent powerboat designer of the second half of the twentieth century. He designed almost every type of powerboat, from small planing hulls, to luxurious megayachts, to mid-size production cruisers and sportsfishermen, to commercial fishing boats, to party boats, to a pioneering 587-foot integrated tug-barge system. In recognition of his extraordinary work, Jack has already been elected to the NMMA hall of fame. Jack was also a Westlawn graduate and over the years, several Westlawn alumni have gone on to work under Jack at the Hargrave office.



Jack also was a pioneer in fiberglass construction when this material was just beginning to be employed for boats. Many of the methods we use today to fabricate fiberglass vessels, were Hargrave innovations. The first of these fiberglass craft was the 41-foot *Knit Wits*, to the requirements of Willis Slane of the brand new Hatteras. This was a larger fiberglass boat than anyone had ever attempted before, and the first boat Hatteras ever built. Many people said it couldn't be done, certainly not in fiberglass. In spite of all the skeptics, *Knit Wits* was launched on time, and performed flawlessly, reaching a top speed of 36 knots, with a smooth ride. Slane took seven orders the first day.

The 2008 Inductees to the NABD Hall of Fame.....Continued from Pg. 1



Hargrave's 184 ft. *Katamarino*

Jack's eye was legendary. Ed Baldwin (a Hatteras production engineer) commented, "Jack was blind in one eye, but I always said the other eye made up for it. He could pick out a flaw in a mold or gelcoat better than anyone with two eyes could." In fact, Jack's incredible eye was not just for flaws and defects, but for form and proportion. He was not simply a boat designer, but an accomplished artist.

The list of builders that Jack Hargrave designed for is astounding. There are simply too many to give them all but you can get a flavor. There's: Hatteras, Burger, Palmer Johnson, Derecktor, Striker, Trumpy, Prairie Boatworks, Choy Lee, de Vries Lentch, Amels, Halmatic, Hitachi Zosen, Trident, Hike Metal, Lantana, Halter, and many, many more. In some cases—like Hatteras and Burger—the Hargrave design and the builder's name went hand in glove for decades.

Dick Newick



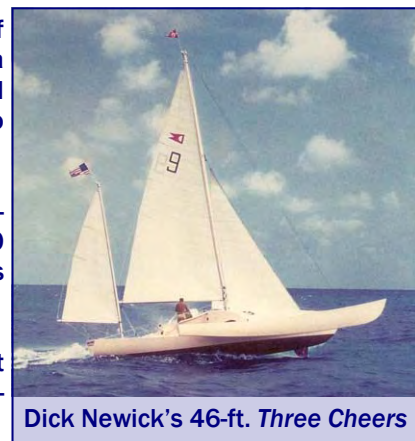
Dick Newick has had a 50-plus year career in boatbuilding and design, and has been one of the most important multihull designers in history. Early in his career he got a job as a boatbuilder, and ended up managing the company before the Korean War shut the shop due to scarcity of materials. Dick sailed and explored much of U.S., Europe, and the Caribbean. In fact, he arrived in the Caribbean delivering a 34-foot ketch to St. Croix. He liked it there and decided to stay. Not only did Dick meet his wife in St. Croix but he designed and built a 40-foot day-charter catamaran—the boat that got him started in multihulls. The rest, as they say, is history. Not only did that first cat last 42 years in service, but Dick built the charter business to five vessels before he sold it and moved to Martha's Vineyard, where he spent the next 16 years designing and building multihulls. And what multihulls!

It's hard now to conjure up how daring and visionary this all was in the 70s and 80s. The old multihull vs monohull arguments were still on everyone's mind, and only a relative few others were actively working in the field. Dick's designs were unique and almost instantly recognizable for clean lines, organic shapes, light weight, and simplicity of construction and outfit. Even his cruising boats were simple speed machines.

Challenged by the OSTAR transatlantic race (today the TransAt), Dick designed one of the most radical offshore sailing racers in history—the 40-foot schooner-rigged *Proa Cheers*. Such boats had never entered an offshore sailing race before. In fact, they'd had hardly ever been seen by western sailors. *Cheers* was the first U.S. boat ever to complete the OSTAR and she took third overall against much bigger craft.

Cheers was later followed by the 60-foot *Rogue Wave* and the 50-foot *Moxie* trimarans, both skippered by Phil Weld, who dominated the field aboard *Moxie* in the 1980 race to become the first U.S. winner. Over the years, these and other Newick multihulls have placed, 1, 2, 3, 4, 5, 7 and 10!

At nearly 80, Dick hasn't slowed down. He recently designed a long, slender, efficient planing powerboat (a monohull), and has been intrigued once again by the transatlantic Jester Challenge, where his 30-foot *Val III* design would be an ideal entrant.



Dick Newick's 46-ft. *Three Cheers*

Dick Newick's contributions to the development of multihull design in the second half of the twentieth century, simply can't be overstated. Not only would multihulls look different today without Dick's many innovations, but his design's successes paved the way to the full acceptance of multihulls as the universally acknowledged offshore-capable speedsters they are.

The North American Boat Designers Hall of Fame nominating committee, composed of magazine editors, lifelong designers and educators, as well as leaders at various design/boatbuilding schools and museums, selects nominees each year. Judges then vote for their recommended candidates in order of preference, which is combined with the number of mentions among the judges to produce the winners.

For more on Mystic Seaport, where the Hall of Fame will be housed, [CLICK HERE](#)



Westlawn is affiliated with [Mystic Seaport](#). Visit the Seaport to learn about the history of boats, boatbuilding, and design

Westlawn Student Designs and Builds a Rocket!

Westlawn's Shayne Young Discusses the New-Generation 12-Foot Skiff

The following are excerpts from Shayne's letter to Dave Gerr:

After moving from Australia to New Zealand six years ago, I was invited to sail in the 12ft skiff Nationals with a work colleague. Half way through the contest my mate who was driving had to leave for work, and I was left with the boat and the rest of the nationals to see what it was all about. So I called on my best to jump on the front and see if we could improve on near dead last position. Now with my long-time crew and wife on the front and the boat owner out of town, we could set up the boat and sail our style. We were able to claw our way back to 4th in the fleet of 15 boats. Since then these mind blowing little boats have exceeded anything I thought could be possible done in a sailing boat.



The Boat

There are not enough words in the dictionary to describe these boats. So you will just have to imagine for yourself a hull 12ft (3.7m) long with up to 4m of spinnaker pole in front of the stem. Gunwales 6ft (1.8m) wide extending 2ft (600mm) aft of the transom. Deep cockpit, flat deck, and high freeboards weighing in at 99lbs (45kg). Not a pretty thing! Then on top of that sits a carbon mast so tall you swear that you were sure you saw on a 30ft race boat. The most recent big rig I designed now sits 29ft (8.5m) off the deck. Sail area is how would you say mmmmmmm.... Ample. The current biggest working sail area is on the latest Dover design at

236ft² (22m²). The spinnakers are a whopping 450m² (42m²). Now how the heck do we hang on to all that gear. Simple we put on some smaller stuff. The current trend is 4 to 5 rigs hanging off 3 masts. Most of the really good pictures you see are in third or 4th rig conditions when it is blowing 25-40kts.

The rules are a very basic box rule: Hull Length: 3.7m, Beam Max: 1.8m, Minimum hull weight: 45kg, Max extensions aft: 600mm Max bow snub: 700mm, Max depth mast step to bottom of hull: 1.1m,

Designing the new hull

I was asked by the two-time national champ if I could design him a new hull. He has found the Woof very limiting in one big way, it doesn't support him and his crew's massive weight. There combined sailing weight is 450lbs (205kg), a massive load on a 12ft boat particularly in light air. I agreed to take on the challenge, with on stipulation it would have a lot of the new sailing systems now proven on the last boat I had built. So started the list of thing the new boat was going to have and do and not have and not do.

Thing the boat will have and do:

Support a 205 kg crew, low freeboards and high racks, self tacking jib, false floor, retractable pole, fine bow forward so as not to punch waves, hard chine for more down wind speed. Chines would be above the waterline.

Things the boat won't have or do:

Suffer in light air from sinking, suffer in heavy air from being to big aft, nose dive like submarine, sink backwards in bad tacks like the last boat.

Now started the evaluation stage. Before I started looking at drawing the new boat I modeled all the current top hulls. The Woof, FU, Nuplex, and modified Nuplex. All of these hull shapes were modeled in MaxSurf from old measurements and drawings I had taken from the FU years ago, a PDF of the woof and an old MaxSurf model of the Nuplex. All the areas I was interested in were the: waterplane area, WL

beam, prismatic, and wetted surface area.



The next job was to run the models through HullSpeed. This is a great little tool for this type of boat as we sail them dead upright. I looked at the hulls as semi displacement forms that smoothly transition to planing. Sailing upwind the hull spends a lot of the time in this transition area and downwind it is just hard planing except for very light days. A spreadsheet was put together with all the resistance curves, from 0 to 30kts at sailing crew weights of 130-160-205kg. I was looking for some trends. One of the cool little things HullSpeed can now do is model the free surface wave train. This proved very useful as I could now relate the wave train I was observing sailing with what was on the screen and seeing how it affected resistance. With all this info now loaded in my head it was time to start shaping some hulls. The first model started out very conventional, bit of a blend of the Woof and FU aft and



Westlawn Student Designs a Rocket! ... Continued from Page 3

resistance curve was ok, bouncing in between all the other curves. A promising start. Time started to tweak the shape closely watching the wave train changes and resistance curve. A shape would have small tweaks made like widening or narrowing the transom moving volume around until the resistance would go up and then it was saved as a new version. This started producing trends and, if one model was getting to extreme to sail, the trend was considered and a new model was made with that trend blended into the overall hull.

After four major models there was a trend emerging to control the bow wave at the transition zone. Thinking back to sailing the Nuplex and the 18ft skiff, the bow wave travels along way up the bow topsides. Both these boats have fine bow sections. The Woof tends to suppress the bow wave with the full bow sections above the water line. This lead me to placing a chine flat 1/3rd of waterline length from the stem. This flat tapers at the stem to nothing and at the stern to nothing. This was very effective at suppressing the bow wave. Next was moving the chine up and down to see if there were any trends. After some 50 hours of tweaking I was happy with a shape that showed lower resistance in displacement, semi-displacement, transition zone and planing. The biggest gains were in the transition zone where the boats tend to spend most of their time sailing.

The sailing loads are not carried through the hull but through the rack tubes and prod receiving tube. All the hull has to do is keep the water out.

Now the easy designing started, creating 2nd lines drawings, construction drawings, and deck layout on AutoCAD. This boat doesn't have a rig plan yet as we transferred all the old rigs from the old boat to this one.

Sailing

Well, it was certainly a rush to get the rigs on and go for a sail, but wow what a pleasant experience to feel fast and easy with the rig in the wrong place.

This gave us the feeling that there was a lot of potential very early on and all it would take is a bit of time sorting out rigs. Sorting out the rigs is taking a lot longer than normal as the original plan of fitting the old rigs went out the window and some new ones went on. After a lot of messing around and time the old ones went on for the Inters.

The boat is certainly a huge step forward for heavier crews. There are no sticky points particularly when the wind goes a little soft and there is only one on the trapeze. Getting the boat up to speed out of tacks is also a lot better, not sinking as much. Sailing upwind is actually nice in this boat. The fine bow certainly makes a meal of any chop. The crew can also stand further aft upwind, making life a lot more comfortable on the trapeze. Lining up against a Woof hull first time for some training was a great way to see what the boat was capable of. First mode of sailing was keep the same height up wind and compare boat speed, result we were about 25% faster Nice!!! After half an hour of this and having to go back several times to reline up, it was time to try sailing at the same speed and compare height. Result, 5-10 degrees higher, WOW!! and easy to keep the boat in the groove. Average boat speed up wind is between 9 and 12kts not to bad for a twelve foot boat. Downwind the boat is

just sensational, fast and most of all, controllable. One of the thing that stood out most of all at the Inters was the ability to pass 5-6 boats in one leg. One of the best features is the fine bow not creating any resistance at the start of a nose dive like the Woof. This means the boat can be driven twice as hard through a wave and you won't get spat out around the forestay as usual, making life on the trapeze a lot more comfortable. A nice little feature of the wide stern and chine is how stable the boat is. Through a jibe, the boat actually feels firm. Jibing is normally a bit of an interesting maneuver particularly if it's a bit bumpy.

Conclusion

This hull has great future in the class, it is able to carry heavy crew, easy to handle, and fast.

Results so far while not a white wash are certainly very good, considering a lot of rig breaking hiccups in the ten-week lead up to the Inters. Now with some time to work the boat up, we hope to see some white wash results. And if not we will certainly be having fun going stupidly fast downwind.

Cheers,
Shayne Young



Know It All Contest Results From the December 2007 Issue



Six brave soles attempted to solve the problem. Some had the right idea, but alas none had the right answer. However, they should be commended for their valiant attempt. We hope that they are still game and will try to solve this month's question along with all other readers who would like to earn the exalted title of **KNOW IT ALL**. See below for the current issue's quiz.

The question was:

You have a 64-ft. LOA single-screw, voyaging motorcruiser, *Trim 'n Proper*, 60 ft. DWL. Waterline beam is 16.4 ft. Displacement is 120,000 lb. LCB is at 54% and LCF at 57%. The waterplane coefficient is 0.71. *Trim 'n Proper* is powered by a 320-hp diesel and has a total fuel capacity of 1,700 U.S. gallons. The diesel tanks are arranged so their combined center of gravity is at station 4.7 at all fill levels. *Trim 'n Proper* floats exactly on its DWL with the fuel tanks half full. What will the exact flotation of *Trim 'n Proper* be with the diesel tanks topped up? Give the answer in how many inches up or down *Trim 'n Proper* will be at station zero and at station 10. Answers to be in decimal inches to two decimal places.

The Correct Solution is:

(All in U.S. gallons)
1,700 gal. diesel x 7.13 lb./gal. = 12,121 lb. diesel
12,121 lb. ÷ 2 = 6,060.5 lb. fuel to add to top up

Find Trim:

WPA = 60 ft. DWL x 16.4 ft. BWL x 0.71 WPC = 698.64 sq.ft.

Moment to trim one inch:

$$MTI = \frac{0.35 \times WPA^2}{WL \text{ Beam}}$$

$$MTI = \frac{0.35 \times (698.64 \text{ ft.}^2)^2}{16.4 \text{ ft. WL Beam}} = 10,416.7 \text{ ft.} \cdot \text{lb.}$$

54% LCB x 60 ft. DWL = 32.4 ft.
4.7 stations = 47% of DWL
47% x 60 ft. DWL = 28.2 ft.
32.4 ft. - 28.2 ft. = 4.2 ft. arm
4.2 ft. arm x 6,060.5 lb. added fuel = 25,454.1 ft.·lb.
25,454.1 ft.·lb. ÷ 10,416.7 ft.·lb. = 2.44 in. down by the bow

Percentage up by bow or stern is governed by LCF
57% LCF x 2.44 = 1.39 in. down at bow
2.44 in. - 1.39 in. = 1.05 in. up at stern

Find Flotation:

lb./in. immersion = 698.64 sq.ft. x 5.334 lb./sq.ft./in. = 3,726.08 lb./in.
6,060.5 lb. added fuel ÷ 3,726.08 lb./in. = 1.626 in. down due to added weight

Add trim and flotation:

1.39 in. down at bow + 1.626 in. = 3.016 in. down at station zero
1.05 in. up - 1.626 in. = 0.576 in. down at station 10

Answer:

3.02 in. down at station zero
0.58 in. down at station 10

Will You Be The March 08 Know It All?

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 T-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*.

A client comes to you about his sailboat, *SlowMotion*. Its performance under power is not up to par. *SlowMotion* is 30 ft. LOA, 24 ft. WL, 10.25 ft. beam., and displaces 14,000 lb. Power is a single Yanmar 3GH2CE, 28.5 hp, at 3,400 rpm, with a 2.64:1 reduction gear. The propeller is a two-blade fixed sailor type, 17-in. dia., by 13 in. pitch. The prop is centered in an aperture at the aft end of a full keel. The aperture measures 21 inches high at the propeller.

The problem is that *SlowMotion* is sluggish under power. Maximum cruising speed is about 5.4 knots, with top speed just under 5.9 knots. The boat doesn't have much oomph to push into a headwind or headsea. When put in reverse, *SlowMotion* is sluggish to respond or stop, which makes docking difficult.

Answer the following:

- Why is *SlowMotion* achieving only these low speeds, and why is it lacking in oomph?
- What would your recommendation be to improve performance?

Continuing Ed. - Metal Corrosion in Boats Distance Ed. Course for Marine Industry Pros

Newly Revised Distance Study Course
Metal Corrosion in Boats, Course No: TT 500 (Formerly ME 301)
For Marine Surveyors, Boatbuilders, and Yacht Designers.

This comprehensive Westlawn distance study course provides a firm foundation in the causes of metal corrosion and teaches current practices in its prevention, reduction, and cure. It is also the recommended introduction to ABYC's NOCTI Certified Corrosion Certification course.

Topics include: galvanic corrosion, electrolytic corrosion, wastage, pitting, velocity effects, and cathodic protection. The cause and mitigation of corrosion of stainless steel, copper and nickel-based alloy, aluminum, iron, and steel are studied. Special consideration is given to problem areas underwater, on deck and aloft, and in engine and fuel systems.

[Click Here](#) for more details and enrollment information on this and Westlawn's many continuing education courses.

Tuition Assistance

Westlawn's financial aid program offers students two options for financing their tuition for the four-module professional Yacht & Boat Design Program and for the Yacht Design Lite course.

The program offers students two options for tuition financing. With interest rates from 3% to 9%, students now have the flexibility to choose the payment plan that best meets their needs. Students moving on from Module 1 to advanced modules can continue to finance their tuition by rolling over any balance due as they progress in their study.

This tuition-financing program is available through TFC Credit Corporation, which has been financing student tuition for over 35 years. In that time, TFC has financed over 250,000 students at over 1,500 schools. With full-service operation centers in both New York and San Francisco, TFC Credit Corporation is a leader in education-financing. TFC's web address is www.tfccredit.com.

Download, Westlawn's catalog and enrollment forms, from the Westlawn website, to read complete details of the tuition financing through TFC Credit, at Westlawn. [Click here](#) for enrollment forms. [Click here](#) for the Westlawn catalog.

ABYC Courses and Schedule for 2008

The ABYC Education Department has been providing industry certifications, factory training, high school and college curriculum and industry seminars for over 15 years. They are providing the marine industry with the skilled workers required to build and maintain modern recreational water craft.

ABYC is currently scheduling on-site factory training for 2008. Please call ABYC for custom tailored, flat rate, instruction by top industry trainers at your facility (410-990-4460, Ext. 31).

The Marine Certification Program developed by ABYC with "NOCTI Certification*" has proven to be the industry standard. We continue 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.



All Westlawn Courses are nationally accredited by the Accrediting Commission of the DETC

THE DISTANCE-LEARNING ADVANTAGE

Distance learning is *the* cost-effective way to advance your career or train your employees:

- no travel, little or no time lost from work
- no on-site or off-site set up and no facility rental
- no visiting instructors
- modest tuition costs
- start when you want
- study at your own pace



Westlawn Profiles / Dieter Blank of Blank Yacht Designs



Dieter Blank

Dieter Blank, Naval Architect/Yacht Designer and founder of Blank Yacht Design was born in Lüneburg, Germany in 1954. He studied at the Military Academy in Hamburg, Germany, the German Navy Officer's School in Flensburg, Germany, and as a fighter pilot in the German Navy, continued his training at several Air Force schools in the U.S., earning a Top Gun Award in 1983. He studied yacht design at the Westlawn Institute of Marine Technology and gained practical experience at the design office of Georg Nissen in Laboe/Kiel. Dieter graduated from Westlawn in 1997 and established Blank Yacht Design in Tarp, Germany that same year. He is a member of "Deutscher Boots- und Schiffbauer Verband" (German boat-and shipbuilder association)

Blank Yacht Design specializes in the design one-offs and semi-custom high-performance sailing yachts in aluminum and composite construction. Several of Dieter's designs like the Helmsman Carrera, Cross 25-31, and Nordbaelt, were designed for series production. The Cross series production racing boats have placed 1st, 2nd and 3rd on the racing circuit and have been noted for their exceptional performance through the years.



Blank Fall Dry Hull with Lifting Keel

Dieter is experiencing a large demand for yachts with lifting or swing keels and has designed several of these in the 30 to 60 ft. range, some of which are specifically designed to "fall dry" at low tide (see photo at left). Currently Dieter has twelve yachts under construction, eight with lifting keels.



Nordbaelt 46 designed by Dieter Blank

To learn more about Dieter Blank's designs and to view more of his photos and drawings [Click Here](#)

Jules Fleder Honored With the Westlawn Lifetime Achievement Award



Jules Gompertz Fleder

At the ABYC annual meeting and awards ceremony in Miami Beach, Feb. 13, Westlawn posthumously honored Jules Fleder, who passed away in October 2007, with the **Westlawn Lifetime Achievement Award**. This first-ever, special award was given to Jules in recognition of a career filled with achievements and contributions to the boating industry, marine education, Westlawn, and ABYC.

Jules's tenure as Westlawn's President extended over two decades, from 1968 to 1988. When Jules took over the then Westlawn School of Yacht Design, it was a 12-lesson course on wooden boat design. Within a few years, he had single-handedly guided the school to a totally revamped 38-lesson program that included fiberglass/composite and aluminum design with texts written by some of the foremost designers and engineers of the day. The program Jules developed has trained more practicing small-craft designers than any several other schools in the world **combined**

and many of the most prominent and successful designers in the industry received their training through Jules's program. Under his leadership, Westlawn was approved by the Connecticut Department of Higher Education and was accredited by the accrediting Commission of the Distance Education and Training Council.

Jules was an ardent supporter of ABYC and gave long time service as a member of several project Technical Committees. When NAEBM (National Association of Engine and Boat Manufacturers, the predecessor of NMMA) acquired Westlawn from its founder, Gerald Taylor White, NAEBM started a heavy advertising campaign for Westlawn which resulted in an explosion of enrollments in the Yacht Design Course. As it happens, ABYC was having financial problems at the same time. Under Jules's direction, Westlawn donated funds to help keep ABYC afloat during this period. Shortly after, during Jules' tenure with Westlawn, he instituted a program whereby any student who joined ABYC was forgiven one month's tuition. This also helped increase ABYC's membership. Jules's many contributions to both ABYC and Westlawn will not be forgotten, and we are eternally grateful for all his efforts on our behalf.

News & Views

Rhino 4.0 Evaluation available FREE

Rhinoceros 3D is a stand-alone, commercial NURBS-based modeling tool used by boat and yacht designers and others, to create complex 3D models on a computer.

The Evaluation version is a fully functional version (except the clipboard) and will save 25 times. After that it is still functional except it will not save and plug-ins will no longer run. It comes with an excellent extensive tutorial to guide you through the many aspects of creating a model. But learning the program is no cake-walk. It takes a good deal of study and practice to be able to create realistic models. Click here for [Rhino 4.0 Evaluation](#)

The purchase price of the full working version of the program is \$995. But the good news is that the price for students is only \$195.00 and an upgrade from Rhino 3.0 is only \$95.00. ([Proof of status](#) as student, faculty, or educational institution required with order.)

AICW Whitehouse Budget a Mere Token of What is Needed

The \$2.2 million in the White House 2009 budget for the Army Corps of Engineers to dredge the 1,200-mile Atlantic Intracoastal Waterway through Virginia, North Carolina, South Carolina, Georgia and Florida is just a pittance of the amount needed to maintain this essential marine infrastructure.

"The Army Corps needs approximately \$30 million to properly maintain the waterway," said David Roach, AIWA chairman and executive director of the Florida Inland Navigation District. "The nation's waterways have been ignored for far too long, and the American people already suffer the consequences of neglecting critical infrastructure. The lack of maintenance funding will be catastrophic to the economies of every state along the waterway unless Congress steps in and dramatically increases the president's proposal as it did last year."

Roach said that the Atlantic Intracoastal Waterway brings over \$18 billion annually to the state of Florida alone and studies have shown that the four other states mentioned above also gain tremendous economic benefit from the waterway.

Source: Trade Only Today, Feb. 15, 2008

World's Greatest Boat Show



The Miami International Boat Show returned for its 67th run, Feb. 14-18, 2008, at the Miami Beach Convention Center, the Sea Isle Marina & Yachting Center and Miamarina at Bayside.

The world's greatest boat show brings together more than 2,200 exhibitors showcasing the latest powerboats, sailboats, engines and marine electronics and accessories for the 2008 boating season. Interactive seminars and demonstrations helped visitors learn about the boating lifestyle and enhance time spent out on the water.

"The Miami show is the premier event for boat-industry manufacturers and dealers to introduce new products and kick-start sales for the upcoming season," said Cathy Rick-Joule, vice president of southern shows with the National Marine Manufacturers Association (NMMA), which produces the Miami show. "Consumers from across the United States and as far away as Japan travel to Miami for this annual gathering of boating enthusiasts.

Boat Shows like this are living laboratories where students can examine new designs, engines, systems, and equipment, and pickup brochures and company literature to for their design file.

COMITT ADDRESSES SHORTAGES IN MARINE INDUSTRY WORKFORCE

Over 100 workforce development specialists and marine industry leaders met in Fort Lauderdale, Florida, Feb.18-20, to participate in the 2008 sessions of the [Conference on Marine Industry Technical Training](#). COMITT was organized in 2006 to provide a forum to present, and discuss, industry support of marine industry commitment to education, training, certification, and professional development

Addressing the [severe workforce shortage in the marine industry](#), this year's conference concentrated on strategies to recruit and retain marine-industry employees. The

Alumni Gallery



Duracell, designed by Westlawn alumnus Roger Martin . . . Thousands of boats and yachts have been designed by Westlawn alumni. To see a selection of these by Roger Martin and many other Westlawn alumni, go to the Design gallery at www.westlawn.edu

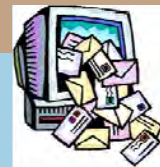
conference featured seminars and panel discussions and started off with a three-hour networking session guided by David Veech, executive director of the Institute for Lean Systems in Louisville, Ky.

For additional information on COMITT, visit www.comitt.org.

Source: Trade Only Today, 2/27/08

Note: Westlawn can attest to the shortage of trained boat and yacht designers and other technical employees. We currently have 26 job offers posted on our website, many of which have gone unfilled for months. NOW is the time go get the training needed to launch your career in the marine industry. See training sources and links on Page 14.

We Get Mail



We received this e-mail from Mike Joyce, President Hargrave Custom Yachts, in response to the election of Jack Hargrave to the North American Boat Designers Hall of Fame (see *story on page 1*). Jack Hargrave, 1922–1996, was considered by many to be the dean of American boat and yacht designers. Hargrave Custom Yachts carries on the Jack Hargrave tradition.

Dear Dave,

I can't thank you enough for the gracious introduction you made for Jack's body of work. Oh how I wish it had been filmed so I could give it to his son and daughter and all the many people who had the honor to work with Jack. He was a hero to me then as he is a hero to me now. I always thought that designer icons like Jack and the other men you honored would never happen again because "the suits" don't want

any starts any more, but now that ABYC has taken them over I am hoping and praying we can find a way to begin to wrestle our industry away from Wall Street which bought into the marine industry for all the wrong reason.

That meant more to me than you will ever know Dave, and just as Lyndon Johnson finished a lot of business for John F. Kennedy, hopefully I can do a few things to help ensure Jack's rightful place in the history of our industry.

Please let Skip and everyone know how proud I am to be affiliated with Westlawn and ABYC. The passion is alive and well in both organizations in spite of the conglomerates. You guys offer a lot of hope for the future of our industry.

Michael Joyce
President
Hargrave Custom Yachts

Tonnage Dunnage

The Many Meanings and Uses of the Familiar Ton

By Dave Gerr, © 2008 Dave Gerr

"She was the *Visigoth*—five hundred tons, or it may have been six—in the costing trade; one of the best steamers and best found on the Kutch-Kasauli line. . . ."

The Wreck of the Visigoth
Rudyard Kipling

Tons and tonnage—you can scarcely read or talk about boats and ships without reference to them. Gross tons and net; deadweight and displacement; volume and cargo—the ton has taken on so many meanings, indeed, that it's often hard to figure out what's being referred to. Yet, tons and tonnage are so inescapable and so useful that everyone involved in the boating business ought to understand their uses—at least in general.

Almost certainly, this ton stuff all started with spirits—you know: beer, wine, ales. Though nearly every sort of cargo has been transported by sea, the oldest and most frequent seems to have been—you guessed it—alcoholic beverages. All those ancient Greek, Phoenician, and Roman wrecks that have been excavated in the Mediterranean are most commonly stuffed with amphorae—graceful pottery containers. Though these had often contained olive oil, grain, or spices, even more commonly they'd held wine.

A Barrel of Tons

Our taste for wine hasn't abated one whit over time, and it was thus the "standard" shipping wine barrel that gave us the word ton. Indeed, "tun," or "tonne" was the Old English and Old French word for barrel. Naturally, with merchantmen carrying cargos of wine in barrels, the government—back then The Crown—wanted a piece of the action. (Ah, this sound all too familiar.) In 1302, for instance, King Ed-

ward I charged a duty of 2 shillings per tun (per barrel) for every single tun shipped, plus he gave himself the right—convenient to be a king—to take 1 tun (1 barrel) from every boat carrying between 10 and 20 tuns, and 2 tuns from every ship carrying over 20 tuns. I suppose—what with a large court and several castles—he had to give his people something to drink. Anyway, from Edward's time on, tons have been inextricably intertwined with boats and shipping.

Interestingly, the original "tun" (wine barrel) was described as "containing not less that 252 gallons or 954 liters." (I wonder how big they could get?) The most common size enclosed about 40.3 cubic feet or 1.14 m³ (42 cubic feet or 1.19 m³ including the barrel itself). It's no coincidence that the filled barrel weighed about 2,400 pounds (1088 kg)—very close to the modern long ton. The "ton," though, has many meanings or applications—a unit of weight; a unit of volume; and an arbitrary measurement unit for registration, licensing, and taxes.

Weighty Tons

Weight is fairly straightforward. A long ton is 2,240 pounds (1016 kg), and a short ton is 2,000 pounds even. (That's 907 kg, not even). Long tons are used almost exclusively with reference to boats unless, of course, you're in Europe, in which case it'll be metric tons—the *tonne*. A metric ton or tonne is exactly 1,000 kilograms. Not surprisingly, since a kilogram's 2.204 pounds, a metric ton equals 2,204 pounds. This is close enough to a standard U.S. long ton for the difference to be ignored for anything but exacting engineering work.

Odd Measures

Now, if you're old enough to remember the old British money system, you won't be surprised to learn that some

Modern Shipping Tonnage

Until fairly recently, there were numerous international measurement systems for the tonnage of ships: U.S., British, Panama, Suez, and more. In 1969 the Inter-Governmental Maritime Consultative Organization met to agree on a universal measurement system. (The Inter-Governmental Maritime Consultative Organization is now the International Maritime Organization or IMO.) Known as the "International Convention on Tonnage Measurement of 1969," not only did this simplify and unify many of the tonnage systems (no more complex loopholes), but it officially changed the basic unit of tonnage measurement from cubic feet to cubic meters. Accordingly, the official unit of tonnage volume is now 2.83 m³ not 100 cubic feet, and the word "ton" isn't employed in official Convention tonnage documents for ships. Instead, a ship is referred to as having "Gross Tonnage 1234" or GT ITC or GT, or "Net Tonnage 1234" or NT ITC, and so on. Even though the word "ton" is no longer officially used in shipping admeasurement, this is still based on Moorsom's tons of 100 cubic feet (2.83 m³). Requirements for the Conventions Measurement System can be found under 46 CFR, Subpart B.

U.S. ships and boats under 79 feet (24 m) must use the older and more "entertaining" Standard system of tonnage measurement (still officially based on 100 cubic feet). This older system remains the one that determines the applicability of U.S. shipping regulations. Though complex, it is this system in particular which allows extreme reduction in admeasured tonnage for regulatory advantage—if, that is, the rules are followed correctly.

The new international system is often referred to as the "Convention Measurement System" and the old system used for U.S. regulations is often called the "Standard" system, but is most accurately termed the "Regulatory Measurement System." Tonnage in this system is "Gross Registered Tonnage" or GRT. U.S. flag commercial vessels over 79 feet (24 m) must be measured under both systems. Keep in mind that a craft that's been finagled to get a low, say, 99 gross registered tonnage measurement under the old Standard or Regulatory Measurement System by playing all the allowable tricks, may well end up as a 600 gross tonnage vessel, or more, under the Convention System, without the "tricks."

rather peculiar British measures added up to exactly one long ton. Brits consider a long ton to be equal to 20 hundred weight, but a hundredweight equals 112 pounds (NOT 100 pounds). There's actually a logical reason for this (if anything about old British measure can be said to be logical); it's that one hundredweight exactly equals 8 "stone," since a "stone" is 14 pounds. (Why a "stone" is 14 pounds and not, say, 10, 12, or 15 I'll probably never know; maybe it's best not to).

The Brits had another peculiar measure, the "chaldron." This was applied to bulk cargos like coal. The old sailing flat-bottomed barges called "keels" used to carry cargos of coal that were taxed by the chaldron. A chaldron about equaled 36 bushels, and this much coal weighs about 2,200 pounds (998 kg)—a ton again.

Displacement, Volume, and the Ton

As a measure of boat weight or size, a craft's displacement's is given in pounds or long tons. (Long tons is the marine standard.) When you survey *Tons Of Fun*, and learn that it weighs 10,300 pounds, its displacement is 4.6 tons—or if it weighs 4672 kg its displacement is 4.76 tonnes (metric tons). Displacement is a powerful concept however. Because a boat displaces the same amount of water it weighs, the volume of the hull—below the waterline—is equal to its weight in water. Since seawater weighs 64 pounds per cubic foot, our 4.6-ton *Tons Of Fun* displaces 161 cubic feet. Or—another way to look at it—is that the volume of the hull below the waterline is 161 cubic feet. In metric, since seawater weighs 1030 kg per m³, our 4.76 tonne *Tons Of Fun* displaces 4.62 m³. See sidebar for useful relationships.

Now, as we've discussed, displacement is the true weight of

a boat at a given loading. It's sometimes called "displacement tonnage." This, though, is landlubber talk. It's redundant like saying, "12:00 o'clock noon P.M."

Legal Tons

Tons of weight or volume apply simply and directly to every boat. They just describe how big or heavy a vessel is. For registration, licensing, and tax purposes, however, there are several other "tonnage measurements"—gross tonnage, net tonnage, registered tonnage, and deadweight tonnage.

These—in their current form—are largely result of a commission set up by the British Admiralty back in 1849 to try and straighten out the considerable confusion resulting from many different tons, tonnages, and tonnage measurements. A fellow named George Moorsom was made honorary chairman, but he ended up so disagreeing with the commission's findings that he wrote his own, which has become known as Moorsom's Rule. The basic problem had been that different cargos had different densities—35 cubic feet equal 1 ton for seawater; 44 cubic feet for coal; and so on—how to standardize the taxable cargo volume of differing craft? Moorsom's suggestion was to arbitrarily call 100 cubic feet (2.83 m³) equal to 1 ton (2,240 pounds or 1016 kg) of general cargo capacity. A brilliant simplifying stroke, Moorsom's

For Seawater			
English		Metric	
1 cu.ft.	64 lb.	1 m ³	1030 kg
1 cu.ft.	7.48 gal. U.S.	1 m ³	1000 liters
1 gal. U.S.	8.56 lb.	1 liter	1.03 kg
1 long ton	262 gal. U.S.	1 tonne	1000 kg
1 long ton	2,240 lb.	1 tonne	970 liters
1 long ton	35 cu.ft	1 tonne	0.97 m ³

basic approach is used to this day.

Commercial Tonnage

From here, it's an easy jump to all those commercial-ship measurements. "Registered tonnage" is the interior volume of the hull, inside the entire usable structure (measured inside plating, inside frames, above floors, under deck beams, and so on). It's calculated in cubic feet divided by 100 . . . Moorsom's tons. Registered tonnage has no real direct relationship to displacement; however, it is further divided into three principle subcategories—"gross," "net," and "underdeck" tonnage.

The "underdeck tonnage" is the volume in cubic feet

(divided by 100) of all the hull capacity under the tonnage deck—the upper deck in a one- or two-deck ship, and the second full or continuous deck, up from below, on all other vessels. "Gross tonnage" is all the volume below the upper deck, minus legally and arbitrarily defined areas supposedly not suited for cargo—for instance minus water-ballast tank volume. "Net tonnage" is gross tonnage minus major deductions (again, arbitrarily defined by law) for areas not deemed usable for cargo.

For more information on tonnage go to:

<http://homeport.uscg.mil>

and in the search box type in "Tonnage Measurement." You

Tonnage Reduction Tricks under "Standard" or "Regulatory" Tonnage Measurement

The old "Standard" or "Regulatory" tonnage measurement system used in the U.S. is based on rules which date back to wooden ships. These rules measured usable interior cargo volume to the inside of the framing as the closely spaced wooden frames wouldn't allow storage between them. In addition, various accepted spaces can be exempted from tonnage volume to reduce gross tonnage. These include, for example, all spaces used for water ballast. So one way to reduce tonnage is to include large water ballast tanks. (They must be fully and properly plumbed, equipped with pumps, and operational.) As long as the volume of water ballast is 30% or less of gross tonnage volume, it will generally be accepted as fair deducted volume. Over 30% will require proof that so much water ballast is really required. Offshore supply boats for the oil industry are often allowed even more water ballast volume. All this is only for water ballast and not for fuel or other tanks, so a tank that does double duty (fuel and water ballast) won't count for any deduction.

Because it's originally based on the concepts from old wooden vessels, the tonnage volume is measured inside the framing even on a metal boat, not to the inside of the planking or plating. (IMPORTANT NOTE: This applies only to all transversely framed boats without longitudinals, not to longitudinally framed metal hulls. If you intend to use deep framing to reduce gross tonnage, you generally have to use an all transverse framed structure.) The height for volume is measured down to the top of the floors. If at least every other floor/frame (or floors/frames spaced no more than 96 inches) comes up quite high, then you can take the depth of hull as the height to the top of these high floors. This can result in a dramatic reduction in volume and so gross tonnage. In fact, if you don't need the under-deck space, you could run every other floor as a non watertight bulkhead right up to the underside of the deck and have no measured volume in the hull at all, except in the machinery space, where such high floor/bulkheads couldn't be employed. Similarly very deep frames athwartships would reduce the measured width. There are further restrictions on the size of lightening holes and similar openings in any deep frame intended to reduce tonnage volume.

You can also run high floors up into tanks to reduce measured volume (any kind of tank, including fuel and fresh water). This works well as the high "floors" serve well as tank baffles.

Areas above the tonnage deck can be excluded by using "tonnage openings." A compartment is deemed "open to the weather" if it has an unobstructed opening at least 48 inches by 60 inches or two such openings 36 inches by 48 inches, with unobstructed access 30 inches either side of the opening. Yet, this tonnage opening can be closed under the rules. You can't use a hinged door, you can't weld it closed, and it can't be gasketed or otherwise made watertight, but it can be closed with a removable cover (a strong welded one) that is held in place with J-bolts, no more than 12 inches on center, with the J hooking around an inside coaming. Such tonnage openings are usually built into the aft wall or bulkhead of the superstructure. You can continue to add similar "openings" inside the cabin structure on bulkheads that open to compartments leading to the previous tonnage openings. Using this trick, you can often exempt a large portion of the superstructure from being included in the tonnage volume. Note that there are additional restrictions on inside passages and bulkheads in spaces to be exempted by using tonnage openings.

U.S. tonnage rules (the Standard or Regulatory system) are covered in 46 CFR 69 Subpart C. There is also the Dual Measurement System (46 CFR, Subpart D). This is similar to the Regulatory system. It doesn't allow tonnage openings, but does permit deduction of areas for the stores and cargo above the tonnage deck. You can use the notes above and this rule for some guidance on designing or building to substantially reduce gross tonnage, under the Regulatory system, but be warned; these are the broad principles only. You really need to work with a tonnage specialist to ensure you achieve a low gross tonnage measurement if that's required. A good three quarters of the rules involve fine interpretations of picky and finicky details. It's not something for the uninitiated to attempt on their own.

will get a screen with several useful PDF documents to select from.

Tonnage Loopholes

Because Coast Guard and shipping regulations as well as duties and fees are based on tonnage measurements, designers are endlessly playing games with the legal deduction rules to keep registered (legally-defined) tonnage low. For instance, a charter boat that measures under 100 gross tons (as admeasured under the law) will be required to meet less onerous regulations than the same craft registered at 101 gross tons or more. ("Admeasurement" is the oh so catchy legalese term for measuring a boat to obtain tonnage according to regulations.) For some craft, like offshore oil supply boats, the volume that can be deducted for water ballast tanks can make what should really be a 700 gross ton craft admeasure to a mere 199 gross tons! All vessels that measure over 200 gross tons must have a licensed captain even if only a yacht. Obviously, playing the tonnage-reduction game to keep a large boat under 200 gross tons is often desirable. Many types of vessels are automatically required to be U.S. Coast Guard inspected when they reach 300 gross tons or more.

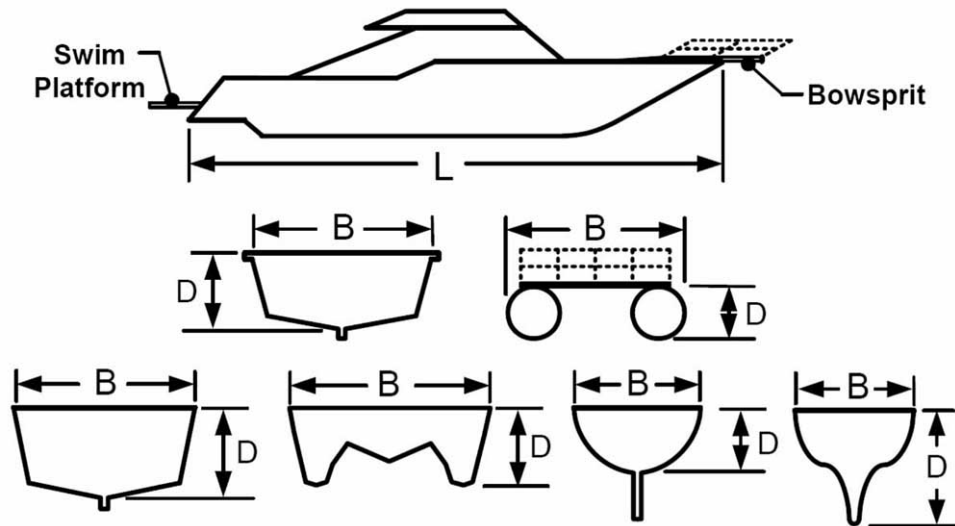
Finally, deadweight tonnage (often abbreviated D.W.T. or DWT) is the real cargo capacity of a vessel—not some form of legalese. It's the difference between the weight or displacement of a vessel empty, but with full crew, complete supplies, and full fuel, water, and lube-oil tanks, and that same vessel with all this plus all the cargo it can carry.

Rule-of-Thumb Commercial Tonnage

If and only if the tonnage legal-loophole game hasn't been played to the hilt, a general rule of thumb is that—for a standard freighter—gross tonnage is 1.5 times net tonnage (or net tonnage is 67% of gross tonnage). Deadweight tonnage—true cargo capacity—is about 2.5 times net tonnage; and roughly 2.25 times gross registered tonnage will approximate true loaded displacement (real boat weight and volume). Accordingly, next time you read about some exciting mishap on 1,200-gross-ton ship, you'll know that it displaced roughly 2,700 tons, and had a net tonnage of 800, or thereabouts. This, by the way, is a pretty small ship.

Gross and Net Tonnage Applied to Boats

Does all this admeasured tonnage business apply to boats? You bet it does. If the owner wants to get *Tons Of Fun* documented in the U.S.—and there are often legal and financial benefits to documentation—*Tons Of Fun* must be admeasured for gross and net tonnage. Indeed, a boat must measure over 5 net tons in order to qualify for documentation at all. What's more, if the boat is intended for charter, you need to know its gross and net tonnage. It's also sometimes required on insurance forms.



As we've seen, for large commercial vessels the complicated formulas and loopholes necessary to keep admeasured tonnage low—to reduce duties and fees—is a bureaucratic maze of the best (or should that be worst) kind. This, as we've discussed, is termed "formal," "standard," or "regulatory" tonnage measurement. It's advisable to consult a tonnage specialist early in the design process. The classification societies are the best source for this assistance—ABS, Lloyds, etc. In fact, they conduct the actual measurement process to obtain legal admeasured tonnage. Happily, for yachts, small charter vessels, and other boats under 79 feet (24 m), there's a simplified measurement system. Using it you can see how our example *Tons Of Fun* admeasures in a few minutes with calculator, pad, and pencil.

Simplified Tonnage Formulas

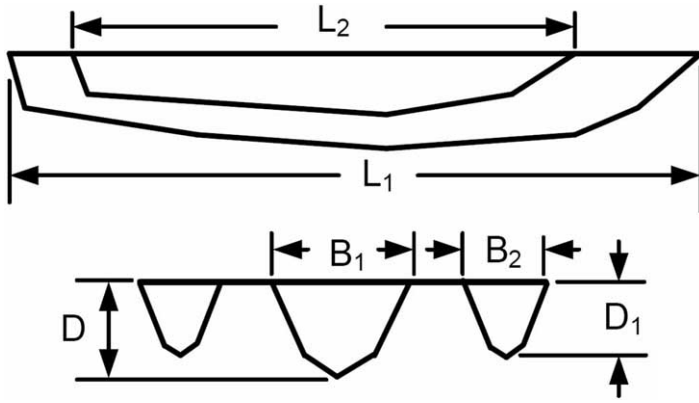
The Simplified Measurement formula for boats under 79 feet (24 m) is under CFR 46, Subpart E. Basically it is:

- Gross Tonnage = 0.84 x (LOA x Beam x Depth of Hull)/100 (for barge like hulls)
- Gross Tonnage = 0.66 x (LOA x Beam x Depth of Hull)/100 (for motorboats)
- Gross Tonnage = 0.50 x (LOA x Beam x Depth of Hull)/100 (for sailboats)
- Net Tonnage = 0.80 x Gross Tonnage (for motorboats)
- Net Tonnage = 0.90 x of Gross Tonnage (for sailboats)

For multihulls, figure the tonnage of each hull and add the deck structure to that, if it has more volume than the hulls.

Note that the LOA (length overall) is measured from the face of the bow or stem aft to the top of the transom at the deck—don't include bowsprits, boarding steps, motor brackets, pulpits, etc. Depth of hull is the vertical height from the deck at side down to the top of the keel taken at midships—it is **NOT** draft. (See illustration above.)

If our *Tons Of Fun* has a quite large houseboat-type deck structure, that has to be calculated and added in separately. Just take the deckhouse length, breadth, and height (side of



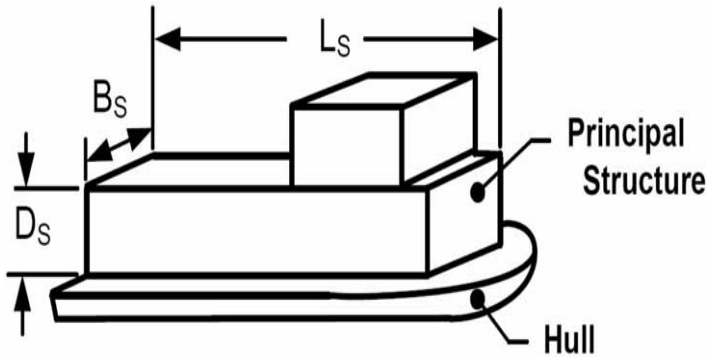
Other Tons Aplenty

The ton has been with us so long and has been used for so many things that we've only scratched the surface. In refrigeration, for example, a ton is the amount of energy required to melt a 1-ton block of ice in 24 hours, or 12,000 BTU. Back on the water, sailing race rules have used tons for years. There was the old British B.O.M. (Builder's Old Measurement Tonnage), which evolved into Thames Measurement Tonnage for assessing boat size. This rule encouraged extremely deep-bodied, narrow, heavy craft and was a source of considerable debate at the turn of the last century—the great "sloop-cutter controversy." More recently, IOR racers of specified rated length in feet were classified as "ton boats." There were quarter-toners, one-toners, etc. Naturally, none of this race-rule stuff is of much practical use and has no real relation to weight or carrying capacity at all.

roof to top of main deck) and run it through the above formulas. Add the result to the hull tonnage. NOTE: Adding the superstructure volume to tonnage applies only if the volume of the superstructure is greater than the volume of the hull (or hulls combined on a multihull).

Say our *Tons Of Fun* was a typical sportfisherman. It's 34 feet overall including a 2-foot anchor pulpit and 12-foot 6-inch beam. You take a tape measure and find the height from the deck at side (at midships) to the top of the keel is 7 feet 3 inches (7.25 feet). Tonnage would be:

Gross Tonnage (for motorboats) = $0.66 \times (32 \text{ ft. LOA} \times 12.5 \text{ ft. Beam} \times 7.25 \text{ ft. Depth of Hull}) / 100 = 19.1 \text{ tons}$
 Net Tonnage (for motorboats) = $0.80 \times 19.3 = 15.3 \text{ tons}$



[Click here for a detailed guide to Simplified Tonnage](#)



Westlawn graduate Otto Ranchi's *Seaguard* fast patrol boat.

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- **April 2007** Tech. Article: Passenger-Compartment Ventilation Fundamentals
- **June 2007** Tech. Article: Stability Is The Key – Part 1, Initial Stability
- **Sept. 2007** Tech. Article: Stability is the Key – Part 2, Reserve Stability
- **Dec. 2007** Tech. Article: Basic Criteria for Powerboat Stability

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The Masthead

News from Westlawn Institute of Marine Technology

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We're on the Web at www.westlawn.edu

Who Are We

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 approved by the [Connecticut Department of Higher Education](#).

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.



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