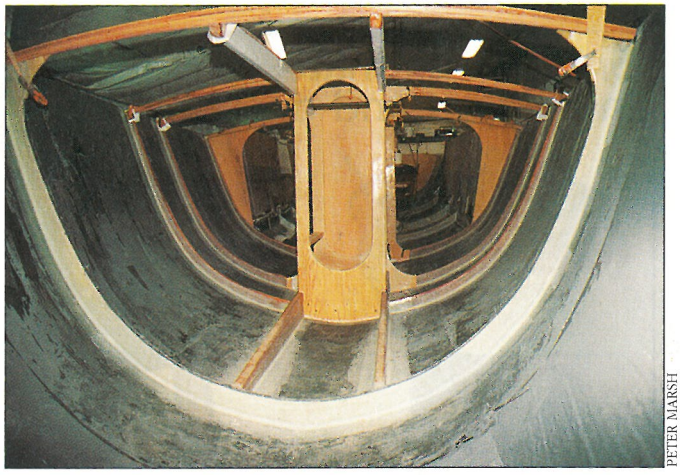

PETER MARSH

# LOSING WEIGHT

Designer Tom Wylie and builder Steve Rander combined to create a super-light 77-footer using wood-foam sandwich construction

by Peter J. Marsh



PETER MARSH

Only a decade ago, carbon fiber in boats was considered "exotic." A material associated primarily with aerospace technology, carbon fiber's steep cost severely limited its marine applications.

High-budget racing yachts found uses for carbon in rudders, spars, space frames, and occasionally wherever the rules allowed. As this sailing "arms race" accelerated, carbon found its way into hull laminates and, once the processing techniques were perfected, the material gained acceptance by more and more boatbuilders.

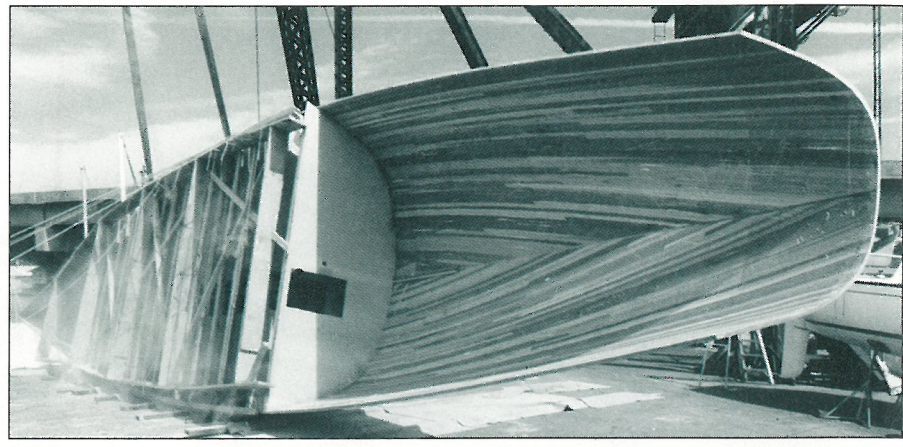
Today, we appear to have reached a point where "state of the art" in racing sail means the hull is nothing less than 100% carbon or Kevlar or related advanced reinforcements. Although carbon costs may be coming down, this trend has caused a huge increase in the price of a competitive design and has rendered many of the world's racing yachts virtually obsolete in just a few years. The growth of one-design and PHRF (handicap) fleets is a visible reaction to this trend, but it is mass production rather than rational utilization of materials that is keeping the price of these boats down.

When it comes to custom work and bigger boats (those over 50′), the new standards in construction mean that few owners can compete with the super-rich. This phenomenon has been well documented in the heavily publicized races, but it also affects regional events, and is especially noticeable on the U.S. West Coast, where downwind racing for line honors in 70-footers is an established class.

A small yard located on the Columbia River in Portland, Oregon, has developed an interesting response to the carbon fiber dilemma. At Schooner Creek

***Above**—Fresh out of the shop at Schooner Creek Boatworks, the Wylie-designed 77′ Jelik waits for its ballast keel. The boat's internal structure **(lower photo)** stiffens a wood-composite, carbon-sheathed hull.*

*Her exterior hull complete,* Jelik *is rolled upright* ***(right)*** *to facilitate the application of carbon and E-glass to the inner wood laminate. The large cockpit* ***(photos, opposite page)*** *keeps the mainsheet trimmer clear of the helmsman and provides a centralized location for the rest of the crew. With only 24,000 lbs of full-load displacement, the Wylie 77's clean deck layout and sail-handling gear match those of a conventional boat half its size.*



PETER MARSH

Boat Works, the alternative material is *wood.* In a recent series of four Tom Wylie-designed sailing yachts—made with wood, Gougeon Brothers' epoxy, and Klegecell foam core—Schooner Creek has demonstrated wood's potential as the original "high-tech" material.

## The Designer

Since the 1970s, San Francisco Bay Area designer Tom Wylie has produced an eclectic portfolio of designs, including the 21′ *American Express*—which introduced water ballast to the biannual Mini-Transat and won the 1979 race—and the WylieCat 30, a surprisingly fast, cat-rigged cruiser. He's also made occasional forays into grand prix racing with a series of IOR designs, and conceived a popular, 24′ trailerable keelboat with minimal accommodations—the Wylie Wabbit.

In 1992 Wylie's work took a new turn when the owner-operator of Schooner Creek, Steve Rander, asked Wylie to design him a 70′ ultralight high-performance cruiser for personal use. Rander wanted to build in wood-foam sandwich construction, intending to cruise with just his wife as crew. Wylie, who prefers to keep a low profile in the yachting world, took these requirements in stride and designed *Rage.*


only the ultimate in comfort and design...

Murray Products by Frank Murray and Sons can only improve on its own quality:

- "Contoured seat" helms chair
- 4" diameter helms pedestal replaces 2 7/8" model
- Custom-designed teak helms pod
- Custom 15 1/2" aluminum steering wheel
- 11" control handles with splined bushings

Murray Quality Speaks for Itself

*See us at Fort Lauderdale International Boat Show Booth #1228 and at Miami International Boat Show Booth #Y94*

MURRAY PRODUCTS
by Frank Murray & Sons
1306 53rd. Street
West Palm Beach, FL 33407
800-416-8772
561-845-1366
fax 561-844-4355
Website:
http://www.murrayprod.com

Circle Reader Service No. 7

Beckson

Beckson Marine, Inc.
OEM SALES DEPARTMENT
165 Holland Ave, Bridgeport, CT 06605
Tel 203-333-1412 Fax 203-384-6954
www.beckson.com

Circle Reader Service No. 117

MARINE FUEL TANKS
Custom Fabricated and Tested to U.S.C.G. Specifications

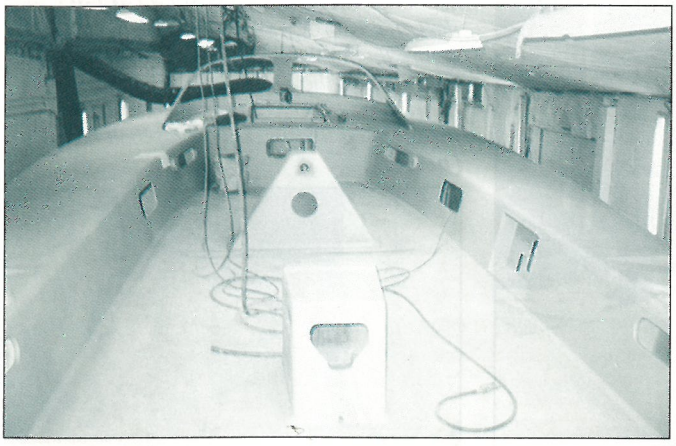
RADAR ARCHES, TEE TOPS AND CUSTOM MARINE METAL FABRICATION AND REPAIRS

1-800-635-9504

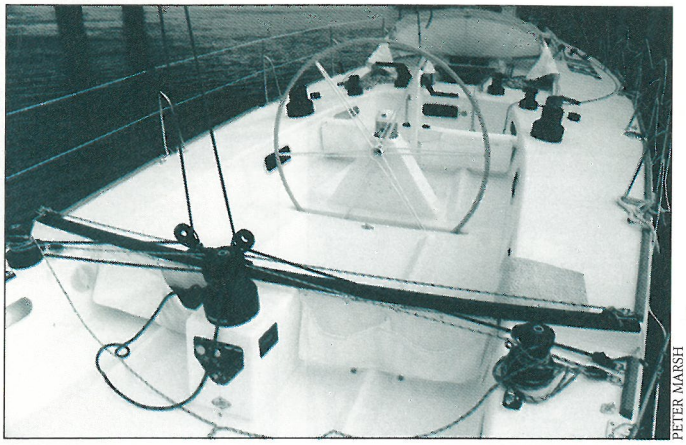
N.E. Propeller, Inc.
68 Von Hillern Street • Boston, MA 02125
617-288-3132

Capeway Welding
9 Apollo Eleven Rd. • Plymouth, MA 02360
508-747-6666 Fax 508-746-8804

Circle Reader Service No. 116



STEVE RANDER



PETER MARSH

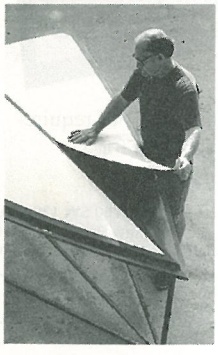
Rander built the boat using a wood-composite method he named the COVE system (for COre-Veneer-Epoxy), and kept the weight down to 21,500 lbs. Her deck layout had no more gear than you'd expect to find on the average 40-footer, but *Rage* proceeded to demolish the Pacific Cup record (San Francisco to Hawaii) in successive races in 1994 and 1996. These triumphs led to the commission of two Wylie-designed, Schooner Creek-built 52-footers for Pacific Northwest owners, both boats being constructed of the same materials as *Rage*, but designed with a more typical beam-to-length ratio for all-round performance.

## The Builder

Steve Rander has been building and racing wooden boats since the mid-1970s, favoring craft that employ double-diagonal epoxy construction. These molded hulls proved to be robust, so Rander began experimenting with Klegecell coring for a proposed cruiser-racer, the 42′ *Magic Carpet*. That experiment was an absolute success: since 1984, *Magic Carpet* has completed five San Francisco-to-Hawaii races, and has logged nearly 100,000 miles of hard, offshore sailing while showing no signs of structural fatigue.

By 1992, Rander was convinced that


NON-SKID PATTERN SOLUTIONS



NEW TOOLING APPLICATIONS

- Attractive and Functional designs
- Easy application
- Pre-applied adhesive
- Thin Flexible Sheets

ONE OFF BUILDERS

Patented process to apply designs directly using Gel-coats, epoxies, or two-part paints (Awl-Grip®, Imron®).

REPAIR YARDS

Patterns & process to repair many older boats.

IBEX See Us at IBEX Booth #1317

Call or write today for free literature.

GIBCO FLEX-MOLD

Call (817) 236–5021 or Fax (817) 236–5020
gibco@swbell.net

Circle Reader Service No. 16


TwinScan™

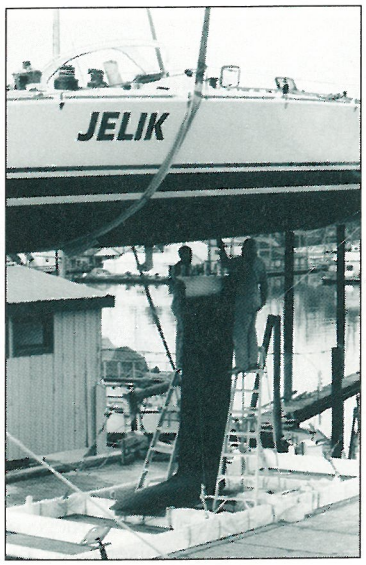
Revolutionizes the Instrument Panel

Outstanding Readability in Half the Space!

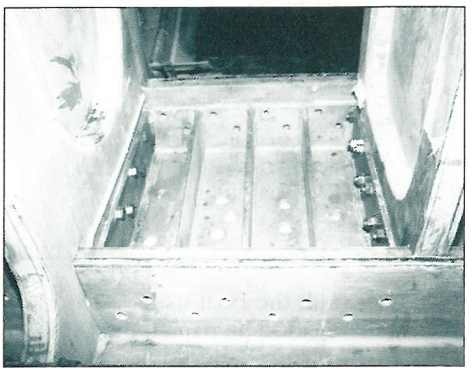
Boat owners will never go back to individual instruments for twin engines after experiencing TwinScan™! Complete control at a single glance. Exclusive patented design and superior performance from the manufacturer of accurate Fuel Computers for gasoline and diesel marine engines for 25 years.

FloScan
Instrument Company, Inc.
Tel: 800-522-3610 • Fax: 206-523-4961
E-Mail: gofloscan@aol.com
Web Site: http://www.floscan.com

Circle Reader Service No. 152




*Schooner Creek's Steve Rander* ***(at left)*** *and designer Tom Wylie examine the bulb keel before the fin is fastened to the boat* ***(far left)****. Inside the hull, keel loads are distributed to the centerline box girder through a galvanized-steel keelbolt box* ***(below)****.*



a wood-foam-epoxy combination was the key to cost-effective raceboat construction, leading him to develop the COVE method for his 70′ *Rage*. Subsequent use of similar COVE laminates on the two Wylie 52-footers prove this system can deliver a strong, lightweight, relatively economical semi-custom yacht.

The latest project at Schooner Creek, a line-honors 77-footer, features water ballast, a minimal interior, and some radical engineering to handle the keel loads. It has given Rander further opportunity to explore the limits of wood-composite construction.

## COVE Construction

*Magic Carpet* was built using double-diagonal ⅛″ planking sandwiching a ½″ Klegecell core, with three spruce stringers

HARD-CORE INFORMATION ON INSULATION

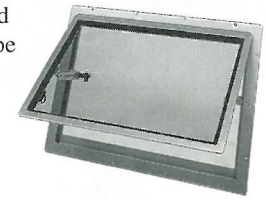
www.glacierbay.com

Write, Call, Fax or E-Mail Glacier Bay, Inc.
1011 S. Claremont Street
San Mateo, CA 94402
(650) 578-0871 Fax (650) 578-0912
E-Mail glacier@glacierbay.com
www.glacierbay.com

Circle Reader Service No. 65

Quality windows at the right price . . .

. . . . in fixed, sliding and vented styles. Built to your size and shape with many available options.



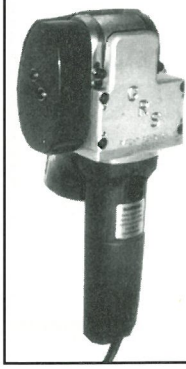
American Marine

Call to discuss your requirements. Or, send for a brochure today.

1790 SW 13th Court
Pompano Beach, FL 33069
TEL: 954-782-1400 FAX: 954-782-1404

Circle Reader Service No. 115

GELCOAT OR PAINT REMOVAL MACHINES



$1,595.00

- Removes gelcoat & bulk laminate.
- Removes bulk build-up bottom paint.
- Great savings in supplies and labor.
- Infinite depth of cut settings.
- Clean operation – DUST FREE.

To purchase, contact GRS, Inc. :
phone 888-269-8465 or 810-793-7401
fax 810-793-1975
email Mulla1931@aol.com *Made in USA.*

Circle Reader Service No. 129


# MORE MARINE MARKETING POWER

## METS 98 - Major International Marine Equipment Display

See thousands of marine equipment and accessory items from around the world for all sectors of the international leisure craft trade and industry. Meet more than 700 marine suppliers from Europe, North America and the Far East. Take advantage of the outstanding international purchasing opportunities.

## METS 98 - for the latest marine business trends and news

Join thousands of international marine trade colleagues to keep up to date with the latest marine business and design trends and news at METS 98. View the range of new marine products introduced at METS 98. METS has become a major platform for the launch of new products. See the winning entries for the 1998 'Design Award METS' Competition.

## Pre-Register for METS 98

METS 98 will be held at the Amsterdam RAI International Exhibition Centre. Opening hours 17 - 18 November from 10 a.m. to 7 p.m., 19 November from 10 a.m. to 5 p.m. Avoid delays and waiting time during your visit by pre-registering.

For a free invitation: Amsterdam RAI, P.O. Box 77777, NL-1070 MS Amsterdam, The Netherlands. Tel.: +31 (0) 20 549 12 12. Fax: +31 (0) 20 646 44 69.

Full details of METS 98 on Internet: http://www.hiswa.nl/mets. E-mail: mets@rai.nl.

Circle Reader Service No. 80

MARINE EQUIPMENT TRADE SHOW

# METS

IBI Official Magazine

IFBSO

ICOMIA

98

17/18/19 NOVEMBER 1998

Europe's annual exhibition of marine equipment, accessories, systems and services for the international marine industry

AMSTERDAM RAI
INTERNATIONAL EXHIBITION

per side. Rander applied a small amount of carbon fiber along the keel and as diagonal strapping, which gave him a bare hull weighing just 1,200 lbs, at a panel weight of 2.0 lbs/sq ft.

*Rage*'s hull is cored with 1″ Klegecell, and skinned with ⅛″ double-diagonal cedar on the inside and spruce on the outside. Two tows of 12″-wide, unidirectional carbon fiber were applied along the keelson, one at 0° and the second at 90°. Panel weight for the hull is 2.13 lbs/sq ft. Her deck is a sandwich of birch, aircraft plywood, and Klegecell core; panel weight is 1.5 lbs/sq ft.

When Rander received a request for a larger, faster version of *Rage*, he convinced his client of the virtues of a wood-composite sandwich, consulted with designer Wylie, then produced a series of sample hull-panels. These were tested at the Gougeon Brothers lab in Bay City, Michigan, to examine several possible arrangements of wood, carbon fiber, and foam core, in seeking the best combination of cost, strength, and durability. The tests, conducted on the Gougeon-developed Hydromat apparatus, showed that a reorientation of the wood fiber would improve stiffness along a single axis—with a slight weight savings—and also speed up construction. *[For a detailed look at the Hydromat apparatus, see "Rethinking Composites Testing," PBB No. 34, page 42—Ed.]*

The modified laminate does require additional carbon fiber to achieve the desired goals of extreme light weight coupled with panel stiffness and strength. But, the amount of carbon fiber involved is minor compared to what would be required to achieve the same structural objectives without strip planking. In practice, the hull construction has proved to be "very efficient," according to Rander.

The 77 has ¼″ Western red cedar strips running fore-and-aft on both sides of a 1″ Klegecell core; the exterior strips are covered with two layers of 6-oz bidirectional carbon fiber laid up in double-diagonal fashion. This schedule weighs 2.08 lbs/sq ft, and eliminates the need for stringers. On the interior side of the laminate, the layup was tailored to match anticipated loads; it consists of unidirectional carbon fiber in a 90° orientation, with supplementary 6-oz bidirectional carbon and 17-oz E-glass applied in high-stress areas.

The 77′ × 14′ bare hull weighs around 2,500 lbs; the ballast keel adds 10,000 lbs, and the all-up weight is 24,000 lbs. Wylie is optimistic that these numbers will help the boat's owner in his quest to "set new records throughout the Pacific." (By way of comparison, the latest generation of West Coast ultralight displacement boats, or so-called "turbo-sleds," weigh in at around 29,000 lbs.)

After Rander's crew cut the 77's three-dozen-plus station molds from particle board, these were erected on a jig and aligned with a laser beam. The boat's inner layer of ¼″ cedar planking, laid over a polyethylene membrane, yielded a very fair hull. Next, the crew epoxied solid blocking in way of through-hulls and the keel attachment, then vacuum-bagged the Klegecell core. Following cure, the core was faired with longboards and the outer layer of cedar pressed into thickened epoxy, then vacuum-bagged from sheer to keel. The Pro-Set 145 epoxy

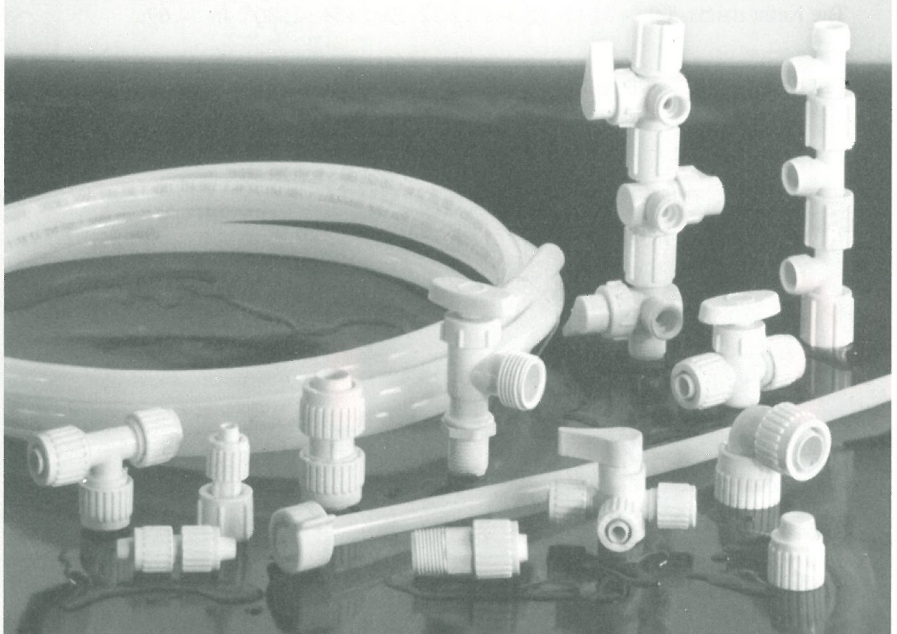

Plumbing Does Not Have To Be Rocket Science...

Finally... a complete plumbing system so easy to use, no experience is necessary. It's GUARANTEED.

Other plumbing products will guarantee their components. But, will they guarantee the system not to leak once installed... especially by a novice?

**Flair-It** fittings and FLEXPEX tubing the perfect plumbing system.

**Flair-It...** *PLUMBING MADE SIMPLE.*



FLAIR-IT/CENTRAL
11212 E. Admiral Place
Tulsa, OK 74116
1-800-842-2543
FAX 918-438-0022

FLAIR-IT/EAST
1126 Kent Street
Elkhart, IN 46514-1740
1-800-456-3726
FAX 219-264-4303

FLAIR-IT/WEST
316 SE Madison Street
Portland, OR 97214
503-238-7228
FAX 503-238-7235

Circle Reader Service No. 142

and 229 hardener was post-cured at 130°F for 12 hours.

Schooner Creek prefabricated four laminated-mahogany ring frames, along with four foam-cored frames for the forward sections. These were securely tabbed to the hull and to a pair of deep wooden stringers spaced 2′ apart, which run from the fo'c's'le to the cockpit. Forward of the companionway, these stringers form the base for a centerline box girder, where we find the Volvo Penta MD22 59-hp engine and saildrive, and the galvanized-steel keelbolt box and aluminum mast-step. The 58-gal fuel tank is housed in the upper, foil section of the keel, bringing all significant weight amidships.

The girder extends up to the deck and is engineered to fully distribute the loads from the keel and rig throughout the hull. Although the girder, in effect, splits the accommodations, the interior arrangement features a functional *centerline* galley. Port and starboard water-ballast tanks have a capacity of 3,400 lbs each, and are connected by a 6″-I.D. rapid-transfer pipe, controlled by a manually operated butterfly valve. Initial loading is achieved with an engine-driven Jabsco pump via 2″-I.D. piping. This system also serves for auxiliary bilge pumping and fire suppression. The tanks are emptied overboard through four 3″-wide "dump" ports fitted with Kevlar flaps.

## Carbon vs. Wood

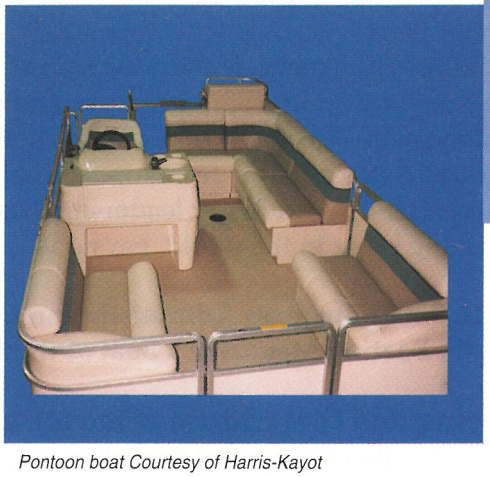
Rander concedes that, while it's certainly possible to build this design entirely in carbon, the cost would be astronomical and, he believes, the competitive life of the yacht would be shorter. It's interesting to note that, to avoid flexing and possible delamination in their bows, the newest of the Open 60 class of racers (the boats that competed in the latest Whitbread) no longer have foam coring in their forward sections; it is a solid carbon-fiber laminate. Laboratory tests, says Rander, in which wood is properly encapsulated in epoxy, continue to demonstrate wood's natural resilience long after carbon, Kevlar, or glass laminates have failed.

The Wylie 77's spars also emphasize cost-effective use of carbon fiber. The 87′ mast is a tapered tube with a circular cross-section built by Composite Engineering (Concord, Massachusetts) with this company's triaxial braiding process—a method, Rander contends, more economical than labor-intensive, hand-layup procedures for making carbon spars. *[Composite Engineering was the cover story of PBB No. 41, page 28—Ed.]*

With his building system working as well as he had hoped, Rander sees continuing potential in the COVE system; he is using it for a Wylie 42—an updated version of *Magic Carpet*—currently under construction. "The carbon fiber could be replaced by less costly E-glass in less weight-sensitive designs," Rander points out. "But the best part of the concept is that wood is easier to work with and also has great resistance to fatigue. When built with modern resins, wooden boats can enjoy a very long life." PBB

***About the Author:*** *Born and raised in England, Peter Marsh worked with designer-builder Derek Kelsall on early sandwich construction. In 1973 Peter moved to the U.S., where he has cruised extensively in small craft and is now a freelance writer on the West Coast.*


MARINE™ TUFF-PLY™
TPO FLOORING MEMBRANE



Pontoon boat Courtesy of Harris-Kayot

Featuring
NON-SKID SURFACE
CLEANS EASILY
WILL NOT ROT
LASTS LONGER THAN CARPET
WILL NOT RETAIN ODORS
COOL SURFACE TO PROTECT SKIN
LESS MAINTENANCE

THE NEW STANDARD OF DECKING QUALITY.
Stress failure from vibration fatigue and thermal cycling is eliminated. And no other decking material resists heat, cold, sunlight, UV radiation, ozone and chemicals better than Marine Tuff-Ply seamless TPO flooring membrane. Plus, beauty is not just skin deep. Marine Tuff-Ply sheet is 100% color. There is no surface color to scratch off, wear or peel. No oxidation is possible, eliminating dips. Marine Tuff-Ply is easy to clean with ordinary household cleaning materials. No wonder the resale value goes up when Marine Tuff-Ply goes on.

Marine Tuff-Ply
TPO flooring system
Out of all the materials and applications available today, TPO has been a performance proven OEM product in the auto industry among others. Its superior resistance to UV light makes it a very practical and durable solution for marine applications.

ALPHA SYSTEMS INC.

5120 DECK DRIVE • ELKHART, IN 46516
(219)295-5206 • (800)462-4698 • Fax (219)522-2231

Circle Reader Service No. 58