

CARBONICS

Advanced Composite Engineering & Manufacturing for Marine & Industrial Applications



GOETZ MARINE TECHNOLOGY PRODUCT BULLETIN • NUMBER SEVEN 1995/96

GOETZ MATERIAL & TECHNIQUE - THE RIGHT MIX

As the newness of carbon fiber masts begins to fade, a more educated consumer/boat owner has emerged. As is the case with many innovative products, the performance of carbon spars has been subjected to close scrutiny. It's no wonder then, when a carbon rig goes over the side it attracts more than its share of attention. One of the regularly asked questions by prospective carbon mast owners has to do with the company's track record. What has come from this line of inquiry is a much better understanding of the importance that materials, engineering, and construction techniques play in determining the quality of a carbon mast.

GMT has built over 100 carbon masts with zero failures, making it the only major builder of carbon spars with a perfect record.

Some spar makers in an effort to cut costs use wet lay up, wound, or cored material. However, masts made from uni-directional carbon pre-preg still have the best safety record by far. The degree to which the resin content is controlled by

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Photo: Chris West

Apogee 50 Westri visits Melchoir Island, Antarctica

GMT- FIRST CARBON SPAR TO CRUISE ANTARCTICA

Regular readers of CARBONICS will recall Tim and Chris West and their GMT carbon sparred Able Apogee 50 set out to circumnavigate South America early in 1994. The Wests chose GMT in part for its reputation of providing a high degree of service to its customers in far away places. They were glad they did! By January, 1995, WESTRI had arrived in King George Island in the South Shetland Island group off the Antarctic Peninsula. For the next month the Wests cruised along the coast heading South, dodging icebergs, whales, and the more severe weather sys-

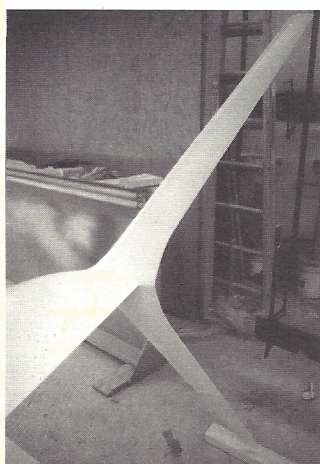
tems. Chris reports having sailed through numerous low pressure systems with recorded wind speeds in the 50 to 60 knots range. In fact it seems the average wind speed for their stay in the 60th parallel was 30 knots. When they weren't ducking into safe harbors (sometimes little more than the lee of a glacial formation or the wreck of a 19th century whaler) the Wests were witness to some of the most dramatic scenery anywhere.

After visiting the Antarctic Base Camps of Argentina, Chile, and United States, the crew made for the Enterprise Islands where they awoke one morning to find WESTRI surrounded with ice (we look forward

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GOETZ SPAR SECOND IN BOC

When Steve Pettingill crossed the finish line in Charleston last May, he sailed into the single handed record books having turned in the best US finish in the event's 12 year history. Placing second, Steve earned the respect and admiration of his fellow competitors and the sailing community in general. Steve put his GMT carbon spar to the ultimate test with critical rigging failures, either of which could have left him dismayed. In leg 2 a windward diagonal shroud parted in more than 30 knots of breeze and in the final leg the weather upper shroud broke in 20 knots with spinnaker flying. To be sure Steve's resourcefulness and quick reflexes allowed him to repair both breakages, but we take pride in having built "the mast that wouldn't die".



Young America's winged rudder

GMT BUILDS WINGED RUDDER FOR PACT

With the America's Cup well behind us (and just a little to the South now), GMT is proud to have been a supplier to all 10 syndicates. The PACT 95 group alone had 3 GMT rudders, including the notable winged rudder (pictured). Master builder Gary Crosby couldn't quite understand why the wings on the mermaid's rudder

were not called "Crosbys" by ESPN's Gary Jobson, but we broke it to him gently.

GOETZ MARINE RUDDERS CONTINUE THE WINNING TRADITION

Two ILC 40's recently launched from Eric Goetz Custom Sailboats sport GMT rudders. The Farr 40 ESMERALDA and Tripp 40 MORE WAR STORIES have been dueling on the water with intensity this past summer. These two Goetz rocket ships are in good company joining HIGH NOON, IDLER, and FALCON also with steering by Goetz.

We are very pleased to announce the new Reichel-Pugh One Design 48 from US One Design will be fitted with

GMT carbon fiber rudders and quadrants. According to John Bertrand, President of US One Design, "GMT was the preferred supplier due to its reputation for delivering quality rudders." Watch for these sleek race horses' debut this Fall.

On the cruising front the new Alden 72 sports an all carbon rudder which weighed in at 152 lbs. (the standard system in stainless steel post and glass blade would have weighed 3 times as much). Other performance cruising boats that retrofit with Goetz rudders this year include a Farr 44, Beneteau 45, Clearwater 35, and a pair of Rodger Martin 40 footers. Call us to see what a difference a lighter rudder with an updated foil shape can make.

IMS LEGALIZES CARBON MASTS

In a long awaited move US Sailing's IMS rules committee voted to issue IMS certificates to boats with carbon fiber spars. We at GMT feel at least partially responsible both for our history of producing high quality carbon spars and for technical support we supplied to the IMS committees studying the issue. This is good news for the IMS sailor who can now benefit from all the advantages of a lighter more resilient spar, previously only allowed cruising boats and those racing under PHRF.

What does a carbon spar mean to racing performance?

- Typically a 40-50% weight saving over aluminum with twice the strength.
- Increased righting moment and reduced pitching make you faster around the race course.
- Improved stiffness of carbon laminates are more user friendly than aluminum allowing less attention to running backstays.
- Carbon spars require less maintenance and last longer than aluminum masts.

Call us today for more information on what the Goetz carbon diet can do for your boat's performance.

GOETZ HIGH FIBER (CARBON, THAT IS) DIET UPDATE

Carbon spars continue to make the difference for cruising and racing boats alike.

BOAT	WEIGHT SAVED	BOAT	WEIGHT SAVED
Sonny	350 lbs.	Pieterrella.....	287 lbs.
Hylas 49	316 lbs.	Windigo.....	360 lbs.
Bucephalus.....	300 lbs.	Bandera.....	430 lbs.
F-27	40 lbs.	Arion.....	340 lbs.
Sea Leaf.....	500 lbs.	S&S 49.....	315 lbs.
Andiamo	250 lbs.	Avatar	770 lbs.
Freedom 35 (15).....	1500 lbs.	Freedom 40 (5).....	900 lbs.
Freedom 24 (5).....	400 lbs.	Freedom 28/33	350 lbs.

Total weighed saved since 1990..... 12,760 lbs.

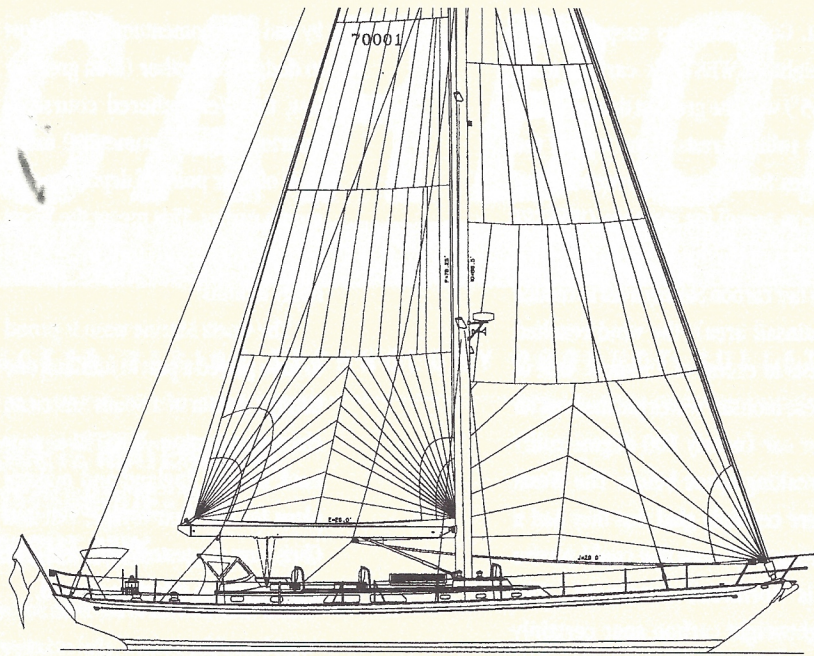
GMT NEWS

GMT has a worldwide reputation for building good looking, strong, composite parts. However we didn't know they were of museum quality until GMT components were selected by the Museum of Modern Art in New York for a new exhibit entitled "MUTANT MATERIALS". This show features innovative components made from new materials. The pieces on display from GMT and GOETZ CUSTOM BOATS included carbon mast sections, cored furniture sample, chain-plate and deck construction samples.

In case you haven't heard, FREEDOM YACHTS has selected GMT as the sole supplier of masts for the fine yachts they build. Freedom felt that the construction techniques GMT has developed would result in a superior spar. They were not disappointed as GMT spars were 20% lighter than the carbon tubes they replaced.

Entering our second year of supplying spars to Freedom we are pleased with the fruits of the last year's labors. Over 30 spars for Freedom's current production boats have been built. Additional spars have been built for retro-fitting earlier Freedom model's aluminum spars (installed prior to 1982.) For details contact Freedom Yachts at 401-683-2900.

The Hinckley Company



Hinckley 70 Avatar

RECENTLY STEPPED - CARBON MASTS FOR WORLD CRUSIERS

GMT has been busy again building carbon masts for large cruising yachts. This spring saw the completion of the Bruce King designed 70 footer built by the Hinckley Company. Designed for a New York art dealer, AVATAR features a 95 foot carbon Stoway mast with hydraulic in-mast furling. The elegant three spreader spar is complimented by an all carbon boom with internal main sheet system and recessed boom lighting. Next in importance to ease of operation by a short handed crew, the aesthetics of the GMT spar needed to match those of the boat. To accomplish this GMT enlisted the aid of noted Trompe L'Ouille artist John Sheehan to paint the below deck portion of the spar to match the quarter sawn maple interior of the main salon. The fit and finish of the Goetz carbon Stoway surpassed the expectations of the client and will undoubtedly compliment this magnificent Hinckley creation for years to come.

Also delivered to Mount Desert, Maine this spring was the mast for SEA LEAF, Able Apogee 58-01. This 80 foot conventional rig has custom mainsail luff track to accommodate a Leisure Furl in-boom furling and reefing system. New to this part of the world the boom furling is set up on the forward starboard side of the cockpit to be operated by one person. Furling line, main halyard, and main sheet are led through stoppers to a pair of Lewmar winches (one electric and one manual). The owners have cruised the Maine coast by themselves in their new Chuck Paine designed Apogee and report life couldn't be better.

New Projects

Currently under production are two spars for boats being built at the Aberdeen, WA yard of Shaw Boats. One is a 55 foot self described "Santa Cruz killer" designed by noted go-fast Naval Architect Paul Bieker. The other boat is a 52 foot catamaran to a Bob Perry design. Both promise to be fast, and will be even more so equipped with Goetz carbon spars.

GMT recently shipped spars for an 82 ft yawl to Southampton Yacht Services in the U.K. This cold molded yacht, designed by Steve Dalzell will feature an all carbon rig painted with "wood effect" to emulate sitka spruce.

Earlier in the year we shipped a 45 pound spar for an F-27 trimaran to the Toronto area. The mast will undoubtedly make the boat go faster and make this trailer-able tri more user friendly.

New for 1996 - will be a number of light weight masts for new IMS racers and a carbon Stoway for the first in a new series of 46 footers from Morris Yachts.

WESTRI *Continued from Pg 1*

to seeing those photos, Chris). Thankful for their Kevlar reinforced hull the Wests gently pushed their way out of the harbor. In Faraday, home to Great Britain's Antarctic Station, the crew reached its southern most goal, with only 30 miles separating them from the pack ice. Along the way back to the Melchoir Islands they came upon a pod of sleeping Humpback whales and recorded some spectacular video footage as the startled whales awoke to WESTRI's engine.

Making the return trip across the Drake Passage to South America the crew experienced their worst storm

yet. Confused seas surpassed the height of WESTRI's carbon mast (65') with the greatest danger being the rolling crests at the tops of the waves. Sailing under the equivalent of storm trysail for steerage (WESTRI has no storm trysail track, but relies on her carbon Stoway mast to reduce mainsail area), the wind reached gusts in excess of 75 knots. One of these monster waves put the boat on her ear (nearly 100 degree roll!) wreaking havoc below. The Wests were certainly glad that they had a strong GMT mast that could survive this torturous treatment. The lightweight carbon spar certainly earned its keep by improving stabil-

ity and roll momentum. In an effort to dodge yet another (even greater) low, the Wests altered course to Puerto Williams, some 200 miles west of their point of departure one month earlier. This meant the Wests got to round Cape Horn twice in as many months!

The Goetz Marine team is proud to have played a part in fulfilling one family's dream of a South American circumnavigation. WESTRI is now back in New England and making plans for her next voyage; Tim and Chris have suggested North as a possible direction this time around.

GOETZ MASTS *Continued from Pg 1*

makers of this material is simply unequaled. Spars made from pre-preg are lighter and stronger.

Attention to the stresses seen at high load areas and locations where mast laminate is cut away is critical to the structural integrity of the spar. The ability to taper the wall thickness of a spar with carbon has long been a strong suit for carbon spars, but this asset can become a liability if proper care is not taken during the design stage. At GMT, our engineers insure that wherever laminate is removed, whether it is for high load areas such as tang locations or less highly loaded areas like halyard exits, the laminate is sufficiently reinforced. Unlike aluminum mast makers who have only recently begun building in composites, GMT has been engineering carbon parts for over ten years. Our record shows that this experience is critical.

Another key element in successful carbon mast building is that the construction methods must assure fiber straightness and fiber com-

paction. Proper application of unidirectional prepreg tape under vacuum pressure insures that the fibers remain perfectly straight. GMT uses proprietary fiber compaction techniques at various stages of laminating and during the cure cycle to eliminate voids. The parts we build at Goetz Marine have a void content of less than one per cent; equal in strength yet without the complication of an autoclave.

As the carbon revolution continues (newly fueled by the IMS decision to allow carbon fiber in mast and boom construction), track record is an important part of any purchase decision. However, equally important is the best mix of technique and material choice. Call us today to see how Goetz Marine can put this winning combination to work for you.



GMT Response Card

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 Name

.....
 Address

.....
 City State Zip Code

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 Telephone

Please add my name to the Carbonics mailing list.
 Please send me more information on the following products.

Composite rudder Carbon spinnaker pole

Carbon fiber mast

Boat type



Goetz Marine Technology

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