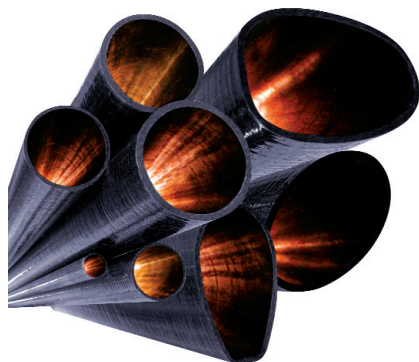


» INNOVATION



Nano what?

New technology makes spars lighter, stiffer, and cheaper

BY DAVID SCHMIDT

» FOR MOST AMERICANS, “NANO” ENTERED their lexicon when Apple first introduced its tiny iPod. Now “nano” has entered the sailing vocabulary, as in “nanotube-enhanced carbon-fiber spars.” It’s a tech-

nology that could eventually be used to build better hulls, rudders, and keels.

Conventional carbon-fiber masts are constructed by laying up individual layers of carbon fiber with epoxy resin and curing them in an autoclave. The strength and stiffness of the resulting mast comes from the carbon fibers, which are held together by the epoxy matrix. But as sailplans have become more aggressive, and as designers seek to make boats simpler (with no running backstays and, in some cases, no backstays at all), there is a greater need for stiffer masts.

Based on its development of composite-in-composite materials—spinning a fiber from nanotubes or spinning carbon fiber that utilizes nanotubes—for NASA, the Zyvex Corporation in Richardson, Texas, recently introduced NanoSolve, a toothpaste-like substance composed of nanotubes and an epoxy binder. A nanotube is an unimaginably thin sheet of graphite that has been rolled up to form a cylinder with a tensile strength 6 to

10 times greater than carbon fibers.

Forte Carbon Fiber Products in Ledyard, Connecticut, mixes NanoSolve with its proprietary epoxy to create an enhanced-epoxy resin. Forte then lays up carbon fiber with this epoxy before autoclaving it to create a stronger spar. This process allows for a thinner mast wall, thus saving weight. “We found that by including NanoSolve in masts built of standard-modulus fiber—say, T700, which retails for \$12 to \$14 a pound—we got the same results that we’d expect from higher-modulus materials—for example, IM7, which retails for \$49 a pound,” says Tony DeLima, Forte’s president. According to DeLima, Forte masts built using NanoSolve are 15 percent stiffer and 10 percent lighter than masts built from the same-modulus carbon fiber and standard epoxy.

NanoSolve is intended for professionals who can formulate composite materials, so don’t expect to be using it soon to patch a hole in your Laser. ♣

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