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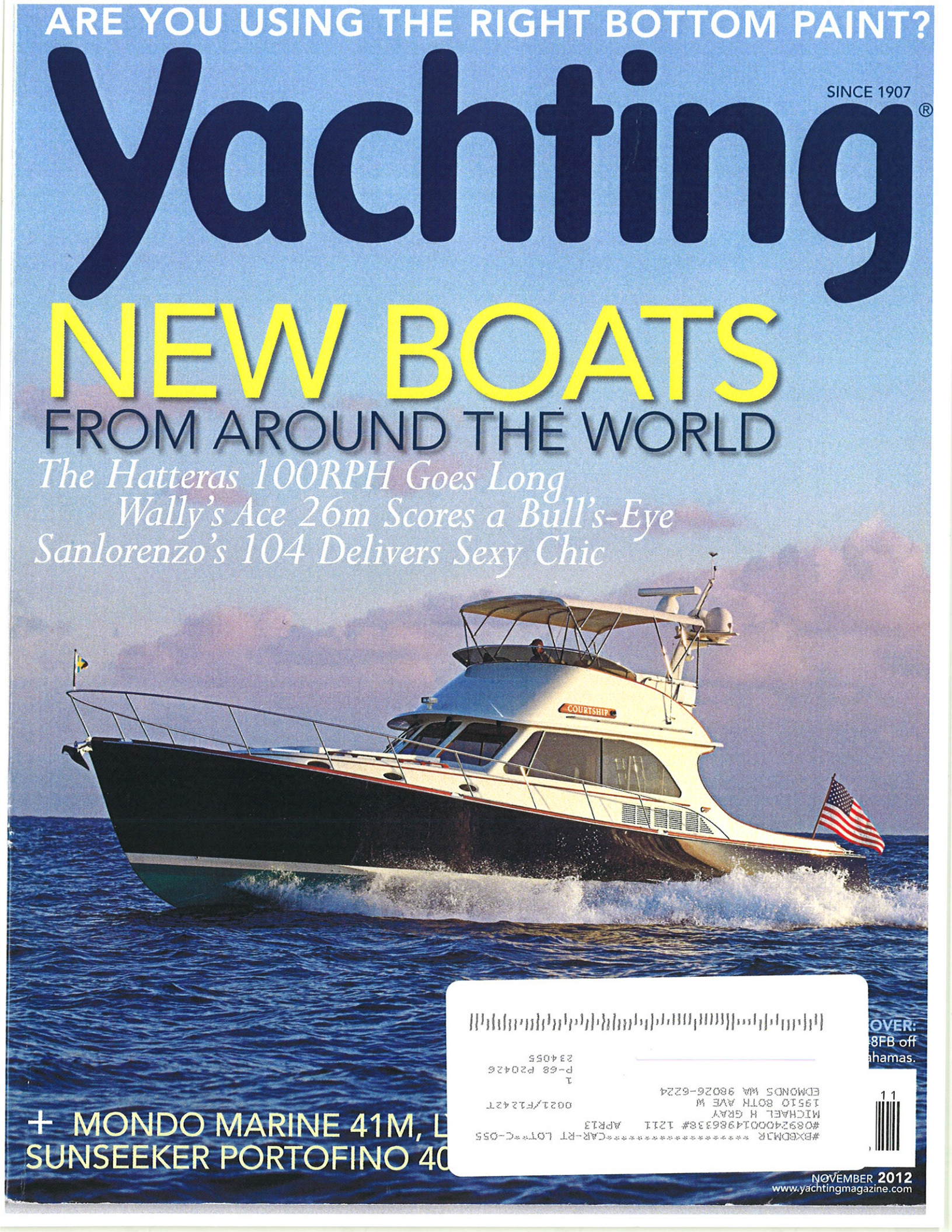

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Covering Your Bottom Antifouling technology has made a quantum leap from the days of copper-clad hulls.

By David Schmidt

Paint is paint, right? Negative. Just ask Wendy Hinman and Garth Wilcox, two Seattle-based sailors who discovered fouling's insidious nature while cruising from Japan to Seattle. On the 46th day of their voyage, a massive storm bore down on *Velella*, the duo's 31-foot sloop. While they were only 18 miles from Vancouver Island's Estevan Point, the underside of their yacht was so entangled with barnacles and weeds that they were forced to withstand a three-day drubbing. "There was no escaping the storm — all because of a filthy bottom," Hinman recalled, adding that they could smell land throughout their epic beating.

A fouled bottom has plagued seamen for centuries. Old-time sailors nailed copper cladding to their ship's hulls, relying on the metal's natural biocide properties to combat growth. Modern technology takes this same concept and applies it to bottom paint, yielding vibrant, low-friction undersides that — with the proper care — thwart growth, even in warm, biologically active waters.

Research into environmentally safe antifouling paints may have made them more effective than ever, but someone still has to man the rollers.

Boats attract two main categories of foul: weed (vegetative matter) and shell (e.g., mussels or barnacles). Both of these can destroy a yacht's running efficiency and cause long-term damage. Sources subjectively estimate that fouling can tax up to 30 percent of a boat's performance, fuel efficiency and — as Hinman and Wilcox discovered — a sailboat's ability to point.

Yachtsmen fight fouling with two basic kinds of biocide paints: hard and ablative. Both of these use similar biocides (typically, copper or cuprous oxide), but as Don Zabransky, vice president of sales and marketing at Pettit, points out, the major difference is in how the biocide releases.

Hard paints yield fair surfaces and release their biocide over time, using a diffusion-control process that delivers more biocide early in a paint job's lifespan. "It's like a block of Swiss cheese — the biocide leaches to the surface," Zabransky said. How fast these

biocides disperse is known as the leach rate, and the challenge for manufacturers is to formulate the proper balance between how much biocide the paint contains and leach rate. "You don't need a lot of leaching," advised Elenor Ekman, marketing manager at Interlux. "These paints only release micrograms each day."

Most hard paints cannot be allowed to oxidize, so a freshly painted boat must be splashed quickly. This means that hard paints have to be reapplied each time the boat is hauled, but their extremely fair finish can last for years (depending on water conditions and performance expectations), and it can be repeatedly wet-sanded.

Ablative, or "polishing," paints also typically use cuprous oxide as the active ingredient, but rather than functioning like Swiss cheese, Zabransky said, ablative paints wear away as the water flows over the hull, exposing new layers of biocide. There are several varieties of ablative paints, with the biggest difference being how the paint erodes. Soft rosin-based sloughing paints are fast-drying and inexpensive, but wear away quickly, whereas controlled-solubility copolymer paints and controlled-depletion polymer paints are only somewhat water-soluble, meaning that they constantly expose fresh biocide to the surface as the boat moves through the water as they deliver a more durable longer-lasting coat. Self-polishing copolymer paints contain a system that reacts with salt water, thus controlling foul via a chemical reaction that takes place on (and inside) the paint's porous surface layer. Because this reaction is chemical — not diffusion-based — these paints work 24/7, irrespective of motion.

A new generation of dual-resin paints, such as Pettit's Vivid or Interlux's Fiberglass Bottomkote NT, combine the best attributes of hard and ablative paints to yield a finish that's slippery and hard, yet resistant to rapid oxidation and wear. Vivid, for example, is made using less than 13 percent copper (40 to 60 percent is common for most copper-based bottom paints). Although Zabransky admits that the product wasn't formulated to be "green," it achieves this goal through a carefully engineered formula that uses biocides and Teflon-like substances to make the hull slippery and inhospitable.

COURTESY INTERLUX

GREENER PASTURES

Copper-based paints may be far less damaging to the environment than their tin-based predecessors, but Ekman, Zabransky and Bob Graham of Luritek, makers of Eco-Clad, advise that greener solutions are available and work well. Some of these alternatives use only tiny amounts of copper (or sometimes white copper), while others

employ different biocides or entirely different technologies.

For example, foul-release bottom paints such as Interlux's polymer-based Intersleek 900 or Pettit's Vivid Free, rely on frequent motion to wash off growth. "These are silicone-based products with no biocides," Zabransky explained. "It makes a rubbery seal on the bottom of the boat. A barnacle might try to cling, but it washes off once the boat moves." If the boat owner is prepared for a small amount of wipe-off maintenance around the waterline, Ekman said, these paints are a great low-friction option for active cruisers.

Graham explained that the chemists at Luritek spent years studying fish to learn why they don't attract fouling before the company formulated its two-part epoxy Eco-Clad. "Biomimicry replicates the natural [antifoulant] slime on a fish," Graham said. "Only a small amount of inert copper, or copper zero, leaches out. Microorganisms feed on the copper zero and create a protective film around the boat that prevents fouling." This film constantly regenerates as the boat moves; moreover, the microorganisms needed to generate the biomimicry film, Luritek purports, are ubiquitous in all types of water and at all temperatures.

Currently, the green scene's bright star is a natural biocide called Econea. "Nothing works like this stuff!" Ekman exclaimed, but he stressed that proper formulation is crucial for good results. "Our new Micron CF is an Econea-based product that's comparable [to] or better than copper-based paints." For the time being, Interlux's Micron CF and Pettit's Ultima Eco are the only multiseasonal Econea paints available, but all Econea-based paints can be formulated into bright colors that can be used on prepared aluminum hulls, sans worry (as opposed to copper-based paints, which require a special primer coat to isolate the copper from the aluminum). Pettit's studies have shown that paints with just 6 percent Econea are as effective as some copper-based paints that are 50 percent metal. "We can make Econea as clean and effective as anything out there," Zabransky said.

Although the paint manufacturers are striving to reduce its environmental impact with alternatives to copper, the volatile organic compounds (VOCs) that are found in all paints are another important consideration. These solvents help paint dry quickly and evenly, but they offgas caustic vapors. To solve this problem, companies are working to perfect water-based paints and products with higher solid contents. "It's important to reduce emissions," Ekman said. "We can make an improvement here as well."

While no one wants to get pasted because of fouling — à la Hinman and Wilcox — no self-respecting yachtsman wants to harm the environment either. Lucky for all of us, modern technology and increased environmental awareness are producing new generations of metal-free, low-VOC antifoulants that can match or perhaps even outperform copper-based products. If you apply the appropriate technology and do the maintenance, you can enjoy cleaner, greener and more efficient boating, whether your bottom line is measured at the fuel dock, on the racecourse or within your own environmental conscience.

BRIGHT SIDES

A look at topsides paints.

Every job demands the right tool. Antifouling bottom paint repels weed and shell. Topsides paint, however, has to provide a high-luster, scratch-resistant finish, while also protecting against UV damage. Topsides paint systems should be easy to repair, allowing an owner or crew to make scratches and dings vanish, sans an unsightly scar.

Tripp Nelson, sales and marketing director at Alexseal Yacht Coatings, said that good topsides paints contain resins, pigments, binders and UV absorbers, among other ingredients. UV absorbers prevent the paint from breaking down, prolonging its life.

Topsides paint must also be able to resist damage caused by salt water, but there are other factors. "Poor maintenance can cause the finish to degrade more than anything. Hard water can create a hard film, especially if it's not chamoised or dried. You don't want mineral deposits."

Wash the topsides to minimize salt buildup, because salt is abrasive and will scratch the paint. "Warm water and vinegar at a 1:1 ratio is a great solution for dissolving salt on the boat." Immediately remove stains before the sun bakes them onto the paint. Use water from the vessel's reverse-osmosis watermaker — rather than the hose — to remove as much salt as possible. Reverse-osmosis watermakers remove all minerals from the water, reducing chamois time. Color has little to do with paint's durability. "The appearance of a white boat looks like it lasts longer," Nelson said. "It's a forgiving color. With dark colors, you see the loss of gloss sooner ... but when you measure it in a laboratory, the results will be about the same."