

Edited by
CHARLES J. DOANE

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The little blue beads in an H2Out filter turn pink once they are full of water. After you dry them out, you can reload them into the filter and use it again

Tech Notes

By Nigel Calder

Magic Crystals

There's a new way to keep your fuel clean

This past summer there was a major problem in Europe with bacterial fouling of marine diesel fuel. This was caused by biodiesel additives required by European regulators that apparently bred a new bacteria. We fell afoul of it ourselves aboard *Nada*. Unlike traditional bacterial fouling that tends to end up in fuel filters as a sulfurous-smelling slime, the new bacteria forms odorless gooey blobs that clog fuel feed lines before even getting to the filters.

Traditional bacteria require water to grow, and this is likely true of this new breed, too. Water gets into a boat's fuel tank either via contaminated fuel or, more commonly, as a result of moisture condensing on the walls of a partially filled tank. The moisture comes from humid air that moves in and out of tanks through vent lines with every change in temperature. In the case of traditional petrodiesel, this water typically settles out at the bottom of the tank, but with biodiesel it may also be absorbed into the fuel. Biodiesel reportedly can absorb 300 times as much water as petrodiesel. In any event, at least in theory (I am not so sure this is true in practice), if you keep water out of your tank bacteria should be unable to proliferate.

In the past, we've always had a pump-out line plumbed to the lowest point in our fuel tank to keep the tank free of water and other contaminants. My failure to do this on

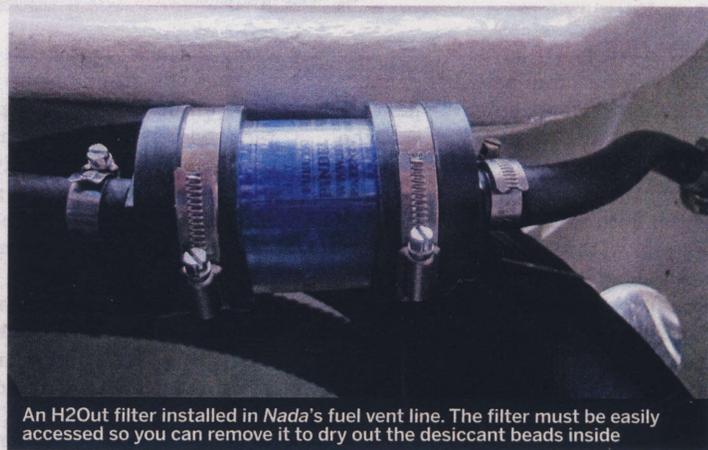
our current boat has contributed to our fouling problem, but even with such a pump-out line it is possible the water absorbed by biodiesel would still be sufficient to breed bacteria. I recently came across a product, however, that solves the problem of water infiltration via tank vent lines and should largely remove the threat of absorbed water in fuel. In fact, it is so impressive my fellow editors at *SAIL* have selected it as one of the 2012 Pittman Innovations Award winners. (See page 62)

REMOVING WATER

The H2Out Filter is nothing more than a transparent in-line canister filled with a desiccant developed by NASA during the Apollo space program. This desiccant

adsorbs moisture (note the "d" instead of a "b") as opposed to absorbing it. During adsorption, water molecules bond to the molecules of the desiccant, which prevents the water from evaporating. During absorption, by comparison, water molecules are held in suspension without being chemically changed, which means water can evaporate out of an absorbent material (as with a sponge). In the case of the H2Out desiccant, heat is required to force the water out.

The H2Out filter is installed by simply cutting a vent line and clamping the two cut ends to either end of the filter housing. It took me just 10 minutes to fit a filter on my boat. When dry, the H2Out desiccant is blue. Once saturated, it turns pink. At this point you simply unclamp the filter (clearly, easy access is important), pull off an end cap, dump the saturated desiccant into a container, dry it out, and then put it



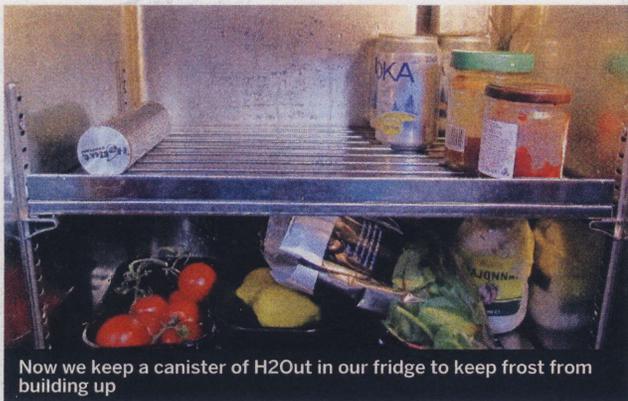
An H2Out filter installed in *Nada's* fuel vent line. The filter must be easily accessed so you can remove it to dry out the desiccant beads inside

back. The desiccant can be dried by heating it in a pan over a stove, or by leaving it for a while in any warm, dry environment. The maximum amount of water the H2Out desiccant can adsorb is equal to 25 percent of its own weight, which is not a lot, but is more than enough to handle whatever comes in through a fuel tank's air vent. The desiccant should not need drying out more than once a year.

H2OUT IN A COLD BOX

This is one of those brilliantly simple ideas that falls into the category of "Why didn't I think of that?" H2Out has been tested by its inventor, Rich Pindell, in a variety of environments over the past three years with encouraging results. Rich keeps coming up with new uses, such as keeping the humidity low in closets and boats in order to prevent mildew, especially when boats are laid up and not in use. One idea I particularly like is using H2Out to reduce humidity in marine fridges and freezers. If you have a newer fridge at home, it has circuitry to prevent excessive frost from building up on the evaporator plate. However, marine refrigeration units typically don't have this feature. Therefore, every time the cold box is opened, humid air enters, which condenses out on the evaporator plate and freezes, resulting in a build-up of frost and ice.

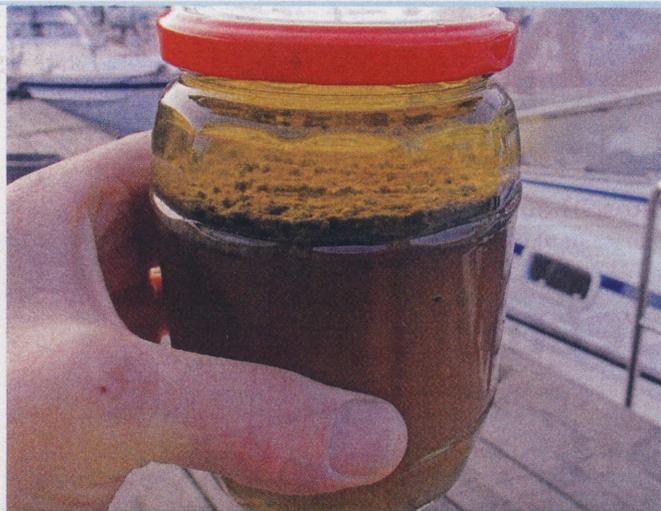
When Rich told me his device would prevent this, and would even de-ice an already frosted icebox, I was skeptical and decided to try it myself on a modestly frosted refrigerator and a heavily frosted freezer. Within six hours the frost had all melted off the refrigerator evaporator plate, and by the next morning the residual water was gone and the evaporator plate and icebox were dry! The desiccant was starting to turn pink, so I dried it out. The freezer meanwhile was partially de-iced overnight, but still had a way to go, so I decided to come at this from a different direction. I defrosted the freezer and ran it for a week with an H2Out container in it. There was minimal frosting.



Now we keep a canister of H2Out in our fridge to keep frost from building up

FUEL POLISHING

Another recently introduced piece of gear that adds a further layer of defense against contaminated fuel is a fuel-polishing system from Parker-Hannifin (parkerfuelpolishing.com). It consists of a small low-powered pump and a standard Parker-Hannifin fuel filter with water-separation capability. It can be installed between an engine's fuel feed and return lines, which requires very little extra plumbing, but is best plumbed to a dedicated line that runs to the lowest point in the tank so that it will pull all the junk out. The pump has an exceptionally low power drain (less than 2



Here's a sample of the sort of bacteria that can grow in your fuel once it is contaminated with water

watts, which equates to 3 amp-hours a day at 12 volts). This makes it feasible to leave it running 24 hours a day, seven days a week. Over the course of a day, it will move approximately 50 gallons of diesel. Over the course of a week, it will circulate all the fuel in most tanks several times.

With constant changes in fuel regulations, we are entering an era of uncertain fuel quality. This may have damaging consequences when it comes to maintaining engines on boats, and it may be years before the situation stabilizes. Protecting your engine with both an H2Out filter and a Parker fuel-polishing module seems to be a cost-effective way to eliminate contaminants from your fuel supply before they make it to even the first filter in the fuel system, let alone the engine itself. *A*

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