

## AN OPEN LETTER TO THE MARINE INDUSTRY

As should be readily apparent simply by reading any of the current yachting publications, particularly those dealing with long-range power boating, the cost of new boat ownership in today's economy has become challenging indeed. For many working-class folks, particularly those mid-career professionals with a spouse and family struggling to keep one's job, pay the mortgage on a house, and perhaps a car or two, the notion that a \$XXXX (insert your own "threshold of pain" here) brand new powerboat with sufficient legs to at least coastal cruise and large enough to house a modest family simply appears out of reach. So, as I and countless others in similar circumstances have done, we turn to the brokerage market, where the value of highly-depreciated assets suitable to the task appears at least manageable. By reaching deep within the wallet, and (perhaps) with the help of a willing lender, the purchase of a boat with sufficient legs, accommodations, and condition becomes possible.

Speaking from experience, for the same money that affords a new 30-foot sport cruiser today, 40+ foot oceangoing powerboats are available if you can overlook the ravages of years of previous ownership. Common wisdom says let the original owner suffer the high depreciation inherent in new boat ownership, let him shake down the numerous systems aboard, hire "Dr. Death" as a surveyor, and buy something suitable for your ambitions and desires. Presumably Dr. Death will guide you away from an unsuitable purchase and into something with significant life still left in it, albeit with some wear and tear and latent maintenance issues to deal with. That's all part of the fun for many!

HOWEVER, and I repeat HOWEVER, there lurks in the bowels of every boat afloat today a financial time bomb waiting to explode on some unlucky boat owner. This explosion will unlikely occur to the original owner, or even the second or third, as these time bombs I want to discuss are unlikely until 20+ years after the original launch date of the boat. I, of course, speak of failures of the tankage. While one can argue that tankage rarely fails, and therefore the cost of making readily-maintainable and readily-removable tankage is not cost effective to most everyone in the ownership chain, this argument falls on deaf ears to the unfortunate owner that finds himself in possession of a vessel with a failed tank.

In the case of a failed water tank, at least the leaking fluid is non-toxic! Typically, in the vast majority of today's recreational vessels, replacement of tankage (water, sewage, and/or fuel) usually requires major disassembly of the interior of the boat, including removal of furniture (galleys, settees, steering consoles, etc.), floors, and the attendant systems (fill and vent hoses, electrical runs, heater ducts, etc.) that often block removal of water tanks. Commonly, the engine(s) must then be removed to gain access to the tanks. And all too often, as tanks are routinely installed in a new build before the deck and attendant support systems are added around it, tankage is often found to be too large to be removed intact. With judicious use of cutting tools, this difficulty can be overcome. But, of course, if the old tank is too large to be removed intact, an identical replacement tank will be too large to be installed intact. So failure of tankage almost always involves engineering and construction of a multi-tank replacement system, with attendant access, hookup, and maintenance issues to overcome. Not a job for a novice, or an owner without deep pockets. While viability of various materials for new and replacement tankage is beyond the scope of this letter, diligent research into replacement materials, marine design engineering principles, fabrication techniques, and competent manufacturing facilities for tankage replacement is imperative. Again, not tasks for the typical recreational boater.

Now I come to what I consider the boat owner's worst nightmare, short of an injury accident or fire. I speak of the failure of a fuel tank. This failure at best manifests itself by the presence of a sheen of spreading fuel on the water after being pumped from the bilge by an automatic bilge pump, or at worst by an explosion at the fuel dock when a gasoline tank fails and dumps raw gasoline into the bilge. Fuel leaks can and do lead to injury and death, and significant civil penalties from the United States Coast Guard and the Environmental Protection Agency. Multi-thousand dollar fines for fuel spillage are not uncommon. And that's just the beginning.

In my home state of Washington, removal of fuel from a boat (to stop leakage from a failed tank, for instance) cannot legally be accomplished with the boat in the water. So, should a fuel leak occur, an emergency

haulout is required, into a repair yard that is readily accessible to the leaking boat, and equipped to deal with what are often large quantities of removed fuel. Should the tank failure and attendant haulout occur in home waters, and if the home waters offer convenient marine services, all the better. Should tank failure occur mid-vacation cruise, particularly into areas with little or no services, all these problems are multiplied.

Next, assessment of the failure is required, perhaps requiring the use of a surveyor should the owner's insurance company become involved. Once the location and nature of the tank failure is determined (which often requires significant disassembly of the vessel's interior, perhaps including removal of an engine or generator to gain access), a repair strategy must be worked out. Should the yard where the boat is hauled be the yard of choice for repair, so much the better. If not, some provision to convey the boat back into the water and moved to the yard of choice (how do you do that, if your fuel system is empty and your engine(s) removed?) must be accomplished. Then the work begins!

At this point in the boat owner's saga, the owner is faced with an inevitable decision-is the boat worth repairing? As with the water tankage discussed above, fuel tank replacement will usually require extensive furniture removal, floor removal, systems disconnects, engine(s) removal, etc. just to gain access to the tanks. Next, the challenges associated with removing large tanks from built-in locations deep in the bilges of the boat must be faced by the yard crew or owner attempting to affect this repair. And lastly, the replacement issues associated with installation of tankage into the interior of the boat must be addressed. All of this equates to just one thing-MONEY.

Wise boat owners budget for maintenance, and perhaps even add additional amounts over and above the annual maintenance fund to a savings account for a "rainy day". Few such funds accumulate sufficient cash to pay for fuel tank replacement, however. The cost to dig deeply into the bowels of a boat to wrestle out a broken fuel tank, replace it with a new tank, and reinstall both the tank and the interior to original condition is simply too expensive to contemplate and budget for. So, again, the decision must be made, is the boat worth repairing? If the boat is mortgaged, it is tempting at this point to simply abandon the boat to the mortgagee, and face the resultant bad credit report. Should the boat be fortuitously insured, this decision is left to the insurance company. The insurance underwriter may well "total" the boat, which while unfortunate, at least minimizes the owner's financial exposure. If the boat is owned free and clear, and either un- or under-insured, the options become more limiting. It is virtually impossible to simply shrug one's shoulders, and offer the boat for sale as-is and where-is, hopefully acknowledging the failed fuel tank. While many boats are sold this way, it is my guess that the likelihood of attracting a buyer willing to face a perhaps unknown and very large repair bill before he can even use his new acquisition is unlikely. Possible but unlikely.

Obtaining credit sufficient to affect fuel tank replacement is possible. And, there are owners with sufficient cash reserves to proceed with the repair. So this situation is not impossible, but certainly painful. In my opinion, the psychological and financial impact of a fuel tank replacement is profound. Many times, this event will cause sufficient damage to an owner's psyche and wallet to force the replacement of the tankage, followed by immediate sale of a boat offered with "new tankage", simply to pay the repair bill.

Therefore, my challenge to the marine industry is this: **DESIGN AND BUILD NEW BOATS WITH READILY REMOVABLE TANKAGE**. Do so by providing soft patches in the way of not only engines, but tankage as well. Do not build the boat around the tankage, but verify the "design for replacement" during the build by installing the tankage during the build process in a similar manner as a future repair yard. Acknowledge that interior furnishings will inevitably need to be removed to facilitate this replacement, so make the furniture modular, with electrical, water, waste, etc. hookups both accessible and replaceable. Put soft patches in the overheads in way of the engines and the tankage. Design the tankage to go through the soft patches without being cut up, and plan for replacement tankage to enter the boat the same way.

Several current high-end power boats are being sold with built-in fiberglass tankage. The virtues of this tankage are extolled by the builders, who tout such features as access openings for cleaning and inspection, fuel polishing systems to remove asphaultines, bacteria, water, etc. from the fuel, and other design features that imply the tankage will NEVER require replacement. (Note that these features can, and should, be provided, regardless of the material of choice for the fuel tankage). However, as the service life of fiberglass tankage has

yet to be substantively proven, the likelihood of a fiberglass fuel tank failure prior to end of service life of the boat itself is **100%**. Only the naïve thinks there is such a thing as a “lifetime” tank. Failure-free for the first, second, or perhaps the third owner. But how ‘bout the poor slob left holding the bag some years from now when the boat builder has gone out of business, the designer has passed away, no drawings for the installation exist, and the owner is faced with a fuel spill from a failed fiberglass molded-in tank? How does he repair or replace such a tank? Chainsaw through the outside of the boat? Perhaps slip in a custom bladder into the failed tank cavity? Re-fiberglass the interior of the tank via the inspection ports? What is the chemical composition of the tankage? What if that chemistry is no longer available because of changes in the petroleum industry? What if the EPA no longer allows open lamination or molding of fiberglass composites because of air quality concerns? Arrhhhh!!

Some aluminum alloy vessels are being sold today with built-in fuel and water tanks in a double-bottom configuration. Many of the same considerations apply. Oxide and/or chloride precipitates from the interior of an aluminum water tank will ultimately reduce the wall thickness, causing that tank to fail. How long will that take? Depends on the chemical composition of the alloy used to manufacture the tankage, the chemical composition of the water inside the tank, the build quality (welds, in particular), and the thickness of the tankage. **BUT IT WILL FAIL!** Should the water tankage form part of a double bottom, the tank can only be repaired or replaced by re-plating the hull. Not a trivial task, nor one well suited for the average marine repair facility. Should that aluminum water tank corrode through the wall of the adjacent fuel tank, not only must the water tank but the fuel tank as well be replaced via re-plating of the hull. Again, non-trivial. Some steel-hulled vessels are being sold today with similar double-bottom construction. Many of the same considerations apply.

Each of these doomsday predictions can be eased (not prevented, but eased) by the provision for intact removal of both water and fuel tanks. This will require some serious re-education of the yachting public, to accept the inevitable cosmetic compromises and cost growth that such design provisions will require. But, as the numbers of boats inevitably grows (nobody has yet figured out just how long the silly things actually last!), the number of failed tanks will inevitably grow as well. To date, few designers or builders have faced this inevitability, and should feel some moral obligation to do so. And, perhaps as the value of older power boats with non-removable tanks tumbles, boat buyers themselves will drive the industry to better accommodate their needs by providing some “design for maintainability” into their products. Boat buyers in today’s yachting market may well be evaluating this “tankage time bomb”, and exercising their right to “vote with their checkbook” by simply walking away from sub-standard engineering practices associated with tank installations until their perceived financial risk of the “Tank-Bomb” is reined in by the marine industry.