

## OSMOSIS

Gel Coat Blisters, also called “Boat Pox” or “Money Bumps” are a very common issue on fiberglass boats of all sizes. They range from little peanut blisters to large voids deep in the laminate.

Many buyers of used boats are scared off by the mention or discovery of hull blisters. In fact I am more surprised to find a 10 year old boat completely blister free. Listen to your surveyor and evaluate the boats overall value accordingly.

Blisters don't sink boats, bait wells sink boats.

An osmotic blister is usually first discovered when the boat is hauled for service and little bumps are found scattered about the bottom. Although ugly and detrimental to the hulls speed and efficiency, blisters are not typically a structural liability.

A true osmotic blister is caused a natural process called osmosis. Osmosis is when a fluid of low density is drawn through a porous membrane by a fluid of higher density in an attempt to equalize the densities. Remember that nature likes balance in all things, especially fluids.

Layman's terms: When a fiberglass boat is made in a traditional mold it is constructed one layer at a time from the outside in. The finish gel coat goes in first, then a layer of mat to hide the print of the cloth, and then the structural cloth layers are applied until the final thickness is achieved. As each layer of fabric goes in the mold and is saturated with resin it is rolled out to remove air bubbles. It is impossible to remove all the little bubbles when hand laminating and so the hull is born with a few internal voids. These voids or air pockets will contain some un-cured resin and un-desolved binding agents from the fiberglass material as well as dirt and dust. Gel coat and polyester resins are somewhat porous and eventually little droplets make there way into the air pockets and dissolve the materials found within creating a fluid more dense than the normal sea water. Because nature hates imbalance, seawater is now drawn in at much greater rate in an attempt to balance the fluids density. This action is osmosis. When a void has been filled the process continues, pressure builds up and a blister is formed.

The problem was rampant in the 1980's and 1990's. Whole industries were created to battle and repair the problem. The costs to owners can be considerable with accumulated lay days, full gel peels, sand blasting and epoxy barrier coats being both common and expensive. Some exotic remedies were delevoped using the application of combined heat and vacuum to expedite the drying process.

The boat builders, resin manufacturers and laminate companies have developed new technology to eradicate the problem in new craft but the cost of the hull is greatly increased.

Exotic builders use a process known as vacuum infusion where the cloth layers are all stacked up at once, the mold is sealed and epoxy resin is drawn in under vacuum. A further step is post curing in a giant oven. This creates a truly void free hull of consistent and repeatable resin ratio and weight that is 100% water proof, strong and very expensive.

Builders still using hand lay-up have moved to using expensive Vynalester resins in the first few layers of the laminate then switching to the cheaper polyester resins for the bulk of the laminate. The Vynalester is less porous than polyester reducing the ability of water to enter the laminate and unlike epoxy bonds well to polyester thereby avoiding ply separation problems.

I often hear the statement that my 30+-year-old Brand X yacht doesn't have any blisters. I have news for you. Gel coat and resin has come a long way. The old resins were in fact so porous in some cases that the osmotic cell doesn't build enough pressure to raise a bump.

Older boats with blister problems should be evaluated individually and repaired on a needs basis. Our local yards are all well qualified to address these repairs. On older boats with dozens of blisters if not deemed structurally threatening I will usually recommend addressing the biggest ones every year at dry-dock. Just plan on doing a few every time you haul for a paint job.