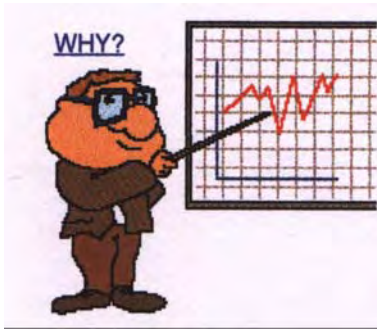


# OSMOSIS

## Bubbles & Blisters

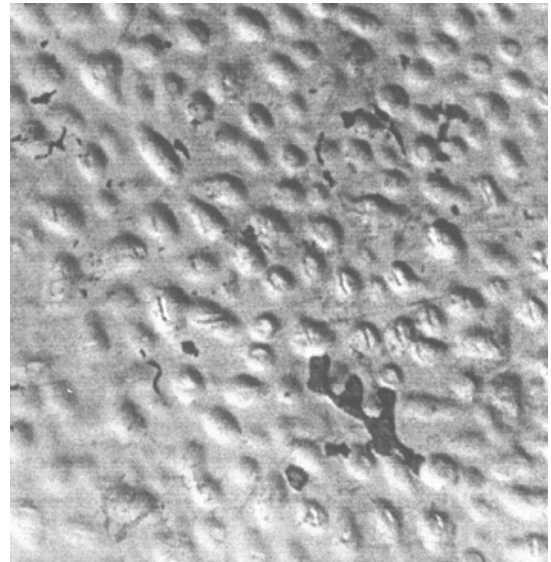
Osmosis involves many boats, including those apparently healthy. Here we take a look at what is usually called “the fibreglass disease” often used and abused for business interests, people either minimize or amplify the problem, depending on the interest of who is selling or buying the boat or who is to repair it.



**What is osmosis ?** It's a chemical-physical phenomenon which occurs during the migration of a solvent, in this case water. Air bubbles trapped within the laminate close to the gel-coat surface are the basic requirement to produce osmosis. First, water migrates through the laminate to fill the trapped bubbles, water will then start to react with every material it can which in this case is the glass fibres and under cured resin. At the end of this reaction, the new solution will attract more water through the gel-coat, so that the pressure inside the bubble will grow and expand. This phenomenon will go on as long as the hull is in the water, your Elysian now has it's first blister measuring 4 to 5 millimetres in width.

### What kind of bubble will surely indicate osmosis?

- 1. The bubble should be round in shape:**  
This is due to the internal osmotic pressure which is constant in all directions.
- 2. The bubble must deform the gel-coat surface:**  
*Sometimes bubbles are located between the antifouling layers. In this case it is an antifouling defect only normally caused by applying the paint in damp conditions or when the antifouling is not properly thinned - this is not osmosis.*
- 3. The bubble must contain liquid:**  
It may be just a drop from a small bubble, but will be a lot on a large bubble ( say more than 2 to 3 centimetres). The liquid inside the bubble or blister will always have an acetic smell and will feel smeary on touching. This happens because inside a bubble filled with osmotic liquid, the Polyvinyl chloride which is around the glass fibres is converted by the osmotic process into Polyvinyl acetate causing the strong acetic smell from a punctured blister.



Osmosis is difficult to capture on film, however if you look carefully you can see the gel-coat is completely deformed by small bubbles. You will also notice some of the bubbles are not round as they have joined up with other bubbles, creating even larger bubbles. These bubbles are also known as blisters, either way this is a severe osmosis 'rash'

**Osmosis age is important!** Blisters which contain a bright yellow or green liquid indicates very recent osmosis, while a large blister over 3 centimetres in diameter containing dark sometimes even black strong smelling liquid is very advanced osmosis which may have been left untreated for over 10 years. In short, for a blister to be of an osmotic nature, it must have a round shape, it must be located under the gel-coat and it has to contain an oily liquid with an acetic smell.

# OSMOSIS

## Reducing the Risk of infection

**As we have already mentioned, osmosis can only occur if the hull is sitting in water, which for obvious reasons is why the hull suffers most and structures such as the decks and cabin tops remain unaffected by this disease.** Words By G.Ralph

During my 4-year study on this subject I have inspected many boats and spoken to a great many owners in order to gain an overall picture as to why some boats get severe Osmosis and others just a tiny infection.

I was given the opportunity to inspect two Birchwood 25's sitting side by side on hard standing, both boats had been in private ownership since new and used on the River Thames. The first boat had been lifted ashore every winter and showed almost no signs of Osmosis with just one or two very minor blisters which for a boat that was over twenty years old was excellent. In contrast, the second Birchwood had been afloat for nine years and showed all the signs of advanced osmosis, large blisters leaking acetic fluid and general gel-coat cracking as the entire underwater section of the hull had expanded due to water saturation levels and Osmotic pressure. As my study went on, I found this comparison to be true in every type of boat including Freeman's, Seamasters and of course Elysian's.

Another interesting factor is wet bilge's also speed up the effect. Some early Elysian's have showers which drain directly into the bilges, the water is then removed by the bilge pump. This type of boat showed signs of advanced Osmosis all around the shower area proving that bilge's should be kept clean and dry.



## Calculating the Risk

Now that we have an idea as to what Osmosis really is and some of the causes, lets take a look at how we can reduce the risk of advanced Osmosis which is every Elysian owner's nightmare.

1. At the time of purchase, always ensure you have the hull surveyed. This should ensure you against buying a used Elysian with severe advanced osmosis from day one.
2. Have your Elysian hauled out onto hard standing for a period of at least four months in every year to allow the hull to dry out. For obvious reasons this add's to the cost of ownership therefore one winter in every three should be regarded as the bare minimum drying out time.
3. Keep your bilges clean and dry
4. Very minor blisters measuring up to 1 cm in diameter can just be monitored, but not ignored. However treatment of large blisters which measure several cm's should be considered. Blisters which are already leaking acetic fluid require immediate attention.
5. Where there are no blisters evident but damage to the gel-coat is found due to poor lifting slings or a deep scratch is found due to hitting a small under water obstruction this should not be ignored. Repair the gel-coat with a suitable epoxy resin and gel-coat repair kit.

## **Built for Osmosis**

Unfortunately the builders of GRP boats have introduced other problems which will in time attract Osmosis.

1. Poor gel-coat quality, made with a poor moisture permeability resistance resin.
2. Poor moulding practice leading to a high void content in the laminate (trapped air bubbles)
3. Use of excessive catalyst during the lamination process
4. Poor workshop environment conditions (too hot or too cold)

In most cases Osmosis remains a superficial problem, Elysians suffer the effect much the same as any other GRP boat, however caught at its first stage Osmosis really is nothing to worry about but it is not to be ignored or neglected. This report is only a guide which I have prepared for the Elysian Register to be used as an unbiased overview of Osmosis. Free unbiased information is some thing of a rarity when Osmosis is mentioned as unfortunately Osmosis repair is now a multimillion pound cash spinner.