



Finishing the

Ever wonder why that beautiful varnish or paint job you took so much pride in is fading and cracking so early? **David Giddings**, of Drive Marine Services — who sell the popular Bote-Cote and Aquacote range of products — explains some common reasons.

job

What's the best way of getting that perfect finish on your timber or paintwork? There are many theories out there, but finding those that actually work can be a matter of trial and error. The following information is provided based on years of listening to people who think they have the best finish and people with the technical knowledge to place the perceptions into fact. Although it is directed towards clear finishing timber, it is equally applicable to painted surfaces.

Why coatings fail

The failure of coatings is dependent on a few things, the most common being exposure to moisture and ultra-violet (UV) rays. Other factors include the type of coating applied, inadequate/incorrect preparation, sharp corners/inadequate radius and coating damage and joint cracks.

Exposure to moisture

Water molecules are extremely small and moisture will permeate through

Getting the perfect finish
... how would your
brightwork stack up?

most things given enough time. Have you ever had an annoying leak onboard or in a bathroom that was the bane of your life trying to eliminate it? Having timber sealed with a waterproof epoxy is the first step in creating a waterproof barrier, and stabilising timber, all but stopping expansion and contraction due to moisture content variation. This can be substantially greater than thermal effects — witness how a wooden clinker boat left out to dry can have 2 or 3mm gaps between the planks which take up when it is returned to the water.

Not all coatings are waterproof and moisture migrates through the layers of many types of paint causing expansion and contraction. Upperdeck brightwork on a boat is the worst-case scenario. The moisture can also migrate through from underneath if the underside or interior of a hull is not preserved or the surface is damaged.

Ultra-violet rays

Ultraviolet light is the enemy of all finishes, especially clear timber finishes. UV light attacks the coating or varnish itself, as well as the underlying timber. The surface cells of the timber break down, and the coating attached to them then flakes off. UV filters in the top coating help retard this process. Be mindful that epoxy coatings should not be used to protect timber exposed to the sun without a top coat with high UV resistance. Recoating should be undertaken before the gloss levels of the top coat fades significantly because this is the warning that the UV stabilisers are depleted.

Oil-based varnishes

Most oil-based varnishes are only 60-65 percent waterproof and unless there are six to eight coats applied they start to fail by cracking in six to 12 months if not sanded and recoated. The reason they fail in a relatively short time is that the moisture finds its way through to the timber, which causes increased expansion and contraction due to the daily temperature and humidity changes. The other limitation of varnish is that the oil leaches out as it ages and it becomes more brittle; the result is



Figure 1. Varnish breakdown on teak.

cracking because it becomes too brittle to handle the expansion of the timber as the moisture level increases. By sanding and applying fresh coats of varnish regularly it rejuvenates the surface to keep it supple. The other limitation of cheaper varnishes is that they yellow off or darken as they age. With modern coatings available, they should be relegated to interior use only unless you have a love of sanding and the smell of freshly applied varnish.

The timberwork in Figure 1 is a good example of the significance of moisture on brightwork because it is normally covered with specially made Sunbrella covers when not in use, which shows how moisture was the significant influence of deterioration, not UV on varnished surfaces.

Oiling timber is probably the easiest way to maintain a good durable long-term natural finish on timber as long as you are happy to re-oil the surface every three to six months and do not want a high-gloss finish. It is also the easiest finish to recover if it is allowed to degrade and fails.

However, many oil finishes develop black mildew stains, which become very unsightly and difficult to remove.

Two-pack polyurethanes and estapols

Most two-pack polyurethanes and estapols are about 80-85 percent



Figure 2. Teak drinkholder with polyurethane breakdown.

waterproof and depending on the number of coats (at least three are recommended) moisture will permeate through over 18 months to three years, depending on the thickness of the coating, unless the surface is sanded and additional coats applied every 12-18 months. Even a product we sell, Aquacote Topcoat, will fail in two to three years in full exposure without recoating. The advantage polyurethanes have over varnish is that they have very good UV resistance and set extremely tough and are very hard wearing. They remain supple, but they fail by the coating lifting off the surface as the moisture that penetrates through degrades the timber at the bond interface and Figure 2 is a good example of polyurethane failure.

We do not recommend applying polyurethanes direct to timber

for exterior applications due to the difficulty of removing it once the coating fails.

Marine-grade epoxy resins with non-yellowing hardener

These epoxies have excellent preservation qualities and are the closest thing to waterproof available as a coating. Bote-Cote Marine Epoxy Resin, another of our products, is more than 99 percent waterproof and with three coats applied to all surfaces ensures a waterproof surface for many years. Other brands of marine epoxies should have similar properties to Bote-Cote but I have not tested them to determine their waterproof qualities.

The problem with clear epoxies in an exterior application is that they have inadequate UV resistance. They will dull quickly, go chalky, and break down over several months if left in full sun. The result will be similar to varnish if they are not protected with a UV stable coating such as aforementioned Aquacote Topcoat.

Not all epoxy manufacturers have a non-yellowing (NY) hardener. Most epoxy hardeners have more economical ingredients which will yellow in full sun even with a UV-stabilised coating sealing it. You should also be mindful some varnishes and polyurethanes do not adhere well to epoxy and some can be easily peeled off.

Yes, there are epoxy paints, but they are loaded with pigment and UV stabilisers to make them last a few years. They are mainly used for interior waterproof coatings, eg inside steel tanks. As soon as the surface dulls and becomes chalky, it is no longer waterproof.

Clear system

The ultimate exterior finish consists of three coats of a non-yellowing marine epoxy resin and then three coats of a product like Aquacote Topcoat which ensures several years of protection with minimal maintenance. Be mindful that many single-pack varnishes and estapols do not adhere well to epoxy and will peel off if pressure is applied. I am unable to comment on other brands of two-pack products because we have not carried out testing in relation to adhesion qualities

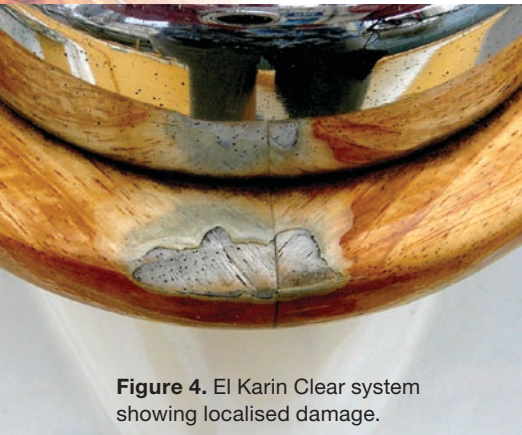


Figure 4. El Karin Clear system showing localised damage.



Figure 5. El Karin winchpad in good condition.

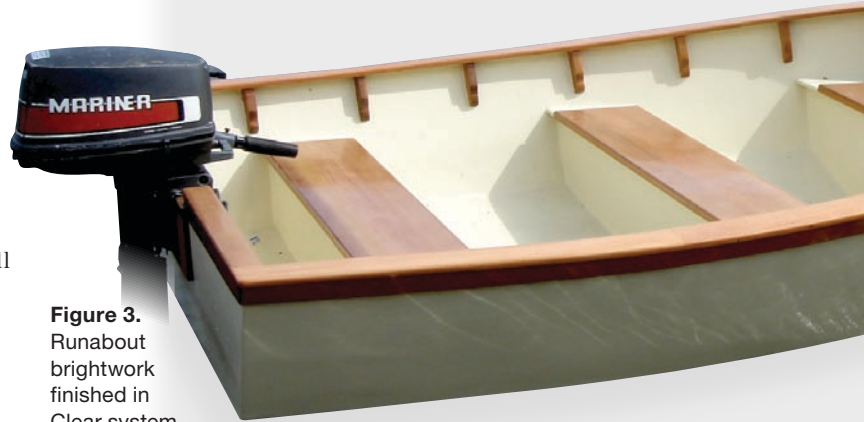


Figure 3. Runabout brightwork finished in Clear system.

“The other limitation of varnish is that the oil leaches out as it ages and it becomes more brittle; the result is cracking because it becomes too brittle to handle the expansion of the timber as the moisture

or ability to withstand long-term exposure to the elements.

To maintain the surface in good condition we recommend lightly sanding the surface every two to three years and applying another two coats of Topcoat to ensure continued good UV resistance and the surface remains in pristine condition. If you are like me and get sidetracked, at least keep an eye on the finish and if it starts to lose its gloss, get a couple more coats of Aquacote on because it is telling you the UV stabilisers are depleting. If not recoated at this stage, there is a good chance the surface will break down.

Inadequate and incorrect preparation

Applying coatings to weathered timber can lead to premature failure because the coating cannot form an adequate bond. Even prepared surfaces left from a few days to a couple of

weeks is too long. This is even more critical with oily timbers and some Australian eucalypts such as red gum and jarrah because their longevity when harvested or in the wild is due to an oxidising film which develops on the sawn surface in a short period of time. These timbers need to be sanded with the grain immediately before coating to remove the oil or oxidation and we recommend this technique for all timbers. Even one hour can be too long. Also, inadequate sanding and cleaning of previously coated



surfaces can cause peeling due to inadequate adhesion.

Another cause of poor adhesion can be using stearated sand papers, or so called "non-clogging" papers (they are visible by their colour which is usually a light grey). Beware! They can leave a residue on the surface that can be a very effective release agent for your next coat of paint, especially products which do not contain solvent. If using them, ensure that you solvent wipe well to remove any possible contamination. Achieving this is another story on its own.

If possible, we suggest you avoid stearated sand papers altogether, and do not solvent wipe a clean sanded surface. Use the red, yellow or green-coloured sanding materials and keep a good-quality wire brush handy to clean the disc if it starts to clog. I know sanding is a pain in the neck but remember all of the effort is in the preparation.

Timber (and epoxy/fibreglass) should be dry sanded with 120-grit paper before applying epoxy seal coats. Then sand down using at least 180-grit before applying your topcoat, and at least 240-grit when sanding between coats. We also recommend finish sanding with a green scourer pad because it lifts off residual dust and provides a good fine finish.

Sharp corners or small radii are a recipe for coating failure because the surface tension of the coating tends to pull away from corners, leaving a thin layer. Also you will tend to sand edges more due to the reduced area. Large radii are good with 10 to 12mm being ideal with 3-4mm being the minimum. Also, when applying sealing coats, apply two or three extra coats to corners and edges to build up adequate thickness for sanding prior to the topcoat.

The final reason for coating failure is cracking at joints which is an indication of a design or construction problem. This needs rectifying or the coating will continue to fail. Epoxy is the ultimate adhesive and loves gaps, but at highly stressed joints it may crack, or more frequently the timber or fibreglass cracks alongside the (stronger) glue line. You need to resolve the stress issue before the coating failure can be resolved. This may require the services of a qualified shipwright or naval architect to provide a solution.


Proof of the pudding

Think I am bias? Figures 4 & 5 are two interesting photographs of brightwork in the cockpit of the yacht El Karin. The surfaces were prepared with three coats of Bote-Cote with NY Hardener, followed by three coats of Aquacote Clear approximately six years ago. Since then the boat has been across the Tasman four times, Fiji, Vanuatu, New Caledonia several times and now back in Australia. No maintenance has been carried out to this brightwork.

Figure 4 showing the winch is very telling because it shows where the sheet has rubbed over the brightwork and damaged it, which allowed moisture and UV rays to penetrate. You can see how the water is moving further under the coating, causing

oxidation and damage to the timber and the de-lamination of the coating is spreading. The damage is absolutely confined to the locality of the failure of the protective film, which allowed moisture to enter. It is also pretty apparent that the degree of sun access to the area under the film which is failing is not a factor.

The other photograph is a spare winch pad which clearly demonstrates just how well the system holds up after six years.

Bote-Cote and Aquacote Topcoat are only two of many such products on the market, but they have been well tested and work, which is why we stock them. If your favourite products are another brand, read the specs carefully and prepare and seal a sample or small area using the Clear system technique. This will allow you to conduct some site testing to ensure they shape up. 

cruisinghelmsman Dave Giddings



Dave spent 22 years in the RAN and learnt to sail during a shore posting. This developed into a love of mucking around with boats and is the proud owner of a Clansman.

During this time he has developed a good knowledge of what works with restoring tired timberwork and fibreglass.



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