John Lilley & Associates Marine surveyors & Shipwright timber/grp

01258 837153 07963 011390 johnlilley@seasurveys.co.uk

Rudders

GRP rudders are generally built to similar designs i.e. the rudder is in two half mouldings port & starboard, similar to two trays bonded rims together.

The rudderstock will have, depending on the builder, two or more tangs welded or bolted to the stock at right angles. In some rudders, two or three holes are drilled in the stock at right angles to the stock and rods are fitted into these. These may be bronze or sometimes mild steel. One half moulding of the rudder is then bonded to these. The remaining half is simply bonded to the first half around the perimeter.

The hollow blade is then filled with polyurethane foam or solid resin. It is always a strong possibility that seawater will enter the hollow or foam filled blade at some stage as the rudder stock entry point is a vulnerable area and difficult to seal.

This can cause chemical breakdown of any polyurethane foam eventually, creating chemicals that can often be responsible for laminate breakdown of the rudder moulding with early blistering and occasionally partial delamination. The other difficulty arises that some builders use unsuitable materials or poor workmanship attaching the tangs to the rudder stock.

Once seawater has entered the rudder eventually corrosion can take place at the tang welds if dissimilar or non corrosion resistant metals have been, used causing failure. Hence the inspection checks for separation of the half mouldings and any evidence of corrosion staining leaking from the join as well as signs of delamination or excessive blistering.

Physical straining of the rudder against a locked tiller is also employed to test for any relative movement, but it is not always possible to completely guarantee the condition of the internal components of the rudder, and it is always advised to contact the original builders for information on materials used or other owners of similar class vessels.

A degree of external deterioration and even waterlogging will not have a huge structural effect upon the rudder, provided the internal bondings are sound and that the welds/tangs are sound. Usually internal deterioration will not be without some external indicators or high moisture readings, but this is not always the case. Moisture meter readings of rudders are always inevitably high or higher than the hull, but this need not be of any serious long term consequence provided the rudder has been constructed to a high standard internally.

Repairs to rudders

Usually the first indication will be cracking close to the stock position near the top of the rudder. The usual type of repair involves removing one face of the rudder; the face that does not have the tangs bonded to it is the usual one to remove. This will be cut with a cutting blade on an angle grinder in the appropriate position. The internal foam will be cleared out and the tang welds checked for both metal type and condition. It may be required to cut back some of the bonding to check these.

Make any required repairs, check the rest of the internal construction and the rebuild rudder with epoxy resins and glass cloth. It can be a good idea to add a bead of polyurethane sealant around the entry and exit points of the stock to slow down any water penetration as the rigid resin/stock joint does crack at an early stage due to inevitable flexing. Some repairers inject foam into the blade cavity after finishing. Some blades have been originally filled with solid resin. This does make the job far more difficult and expensive.

Internals of bronze stock/ mild steel tang rudder

Close up of original corroded mild steel tang just push fit into bronze stock drilling

Teak Decks

Teak decks on GRP vessels can be very problematic for many various reasons. Generally the teak planking on the majority of modern GRP vessels is reasonably thin, sometimes it will not exceed 10 millimetres thickness.

Depending upon the builder, the teak is secured to the deck with various methods, in most cases it is bonded to the deck on a bed of polyurethane sealant. In some cases it is secured with self tapping screws into the outer skin of the deck onto a bed of polyurethane sealant. These screws are often counter bored a short distance into the thickness of the teak and then covered with a matching plug. The rebate seams are usually relatively shallow and often filled with a similar black polyurethane sealant. The problems occur due to loss of adherence of the planking to the deck, this is often found by hammer testing.

This is probably not so serious as injecting some form of bonding fluid under the teak that is loose however can rectify it, it may be that due to possible water penetration, these areas can often be too damp for successful rebounding. The other more serious condition of which there is little cure for is excessive wear to the surface of the teak.

This takes the form of ridging in the deck planks where the softwood between the growth rings has been worn away. The usual cause for this other than general wear and tear underfoot is excessive scrubbing. This excessive scrubbing literally wears the timber away. It might be considered far more successful to use nonabrasive chemical cleaners to avoid this irreversible damage to expensive teak deck. The physical wear caused by foot traffic is usually in the vicinity of the cockpit side decks, the forward end of the foredeck, the aft end of the foredeck close to the mast with a degree of lesser wear along the path of the side decks forwards.

Certain vessels will obviously have more specific areas due to their individual design where this type of wear is more likely. In these areas if often be noticed that the caulking is considerably proud of the surface, this is usually caused by the caulking remaining free from any wear but the teak either side of it being worn away. It is often also noticed that the planks appear to be cupped and no longer flat.

The other serious consequence of this deck wear as a result of the deck thinning, the screw plugs are completely worn away exposing the underlying head of the screw.

It may be possible to further counter bore the timber in these areas and fit a new plug, it may even be possible to remove the screw entirely if the deck planking in this area is well secured however, each individual case is different. The other serious effect is that the rebates between the planking in which he caulking is fitted also wear dramatically thin, with the result that the caulking can no longer hold in position and it is unlikely that a new caulking would remain in position for any length of time as there is a minimum depth of seam rebate required to hold polyurethane caulking.

Once this caulking has become detached it allows water into the seam and the risk of water penetrating between the GRP and the teak. In the case of the deck which has no screw holes for the securing of the deck this may not be to disastrous however, if the water can find its way close to deck fittings and the associated fastenings then the water can capillary into the deck core if one is fitted. As previously noted with regard to deck cores one of the most important aspects of maintenance is to ensure no water enters this core. It is possible to cut new seam rebates, but there is a limit on how deep these can be.

Ultimately the only answer for an excessively worn deck is, unfortunately in many cases, total replacement. This can be far more costly than the fitting of the deck originally as if the deck, as earlier noted, is bedded on a polyurethane compound. It is very likely that in some areas this compound has secured the planking very securely and will probably result in a high degree of labour to remove the polyurethane bedding and some of the original teak. If been possession of a teak deck that is in sound condition then it is imperative to avoid pressure cleaning and any form of regular abrasive cleaning and this includes scrubbing with a deck brush.

It is imperative to get quotes for this type of work because it can affect the value of the vessel considerably and, in the case of a total deck replacement this can run into many thousands of pounds. In my opinion, a vessel that does not have a teak deck can ultimately be more valuable than the identical vessel with a teak deck as, all things being equal there should be no deterioration on the vessel with no teak deck but , the vessel with a teak deck **may** be subject to a degree of deterioration which would affect the value over time. However, that said there is nothing more appealing than the look and feel of a well laid teak deck.

01258 837153 07963 011390   johnlilley@seasurveys.co.uk

Mast support distortion

There is often a deflection in this area of many vessels and can be caused by a variety of conditions.

This area is prone to high stresses and methods of support are many varied. Most vessels will have a degree of deflection here (downward distortion of the area of the base of the mast) and common to a degree, it will vary with tension on the rig. Occasionally it can be caused by, when new, before the vessel had completely cured which can take some time, the mast and rig came under tension before full strength had been achieved in the moulding thus causing a degree of permanent deflection here.

Other causes can be due to insufficient under mast support in the accommodation or a degree of structural failing of this support or, in some cases simply over tensioning the rig.

It is not uncommon for the area to be further supported with the an encapsulated area of solid timber or plywood between the inner and outer mouldings if fitted, again, in the case of encapsulated timber water can often penetrate this area due to fastenings etc and subsequently this area can decay unseen thus losing a degree of structural integrity and allowing the space between the two mouldings to collapse slightly causing the visual distortion on deck.

It is virtually impossible to confirm this in any inspection and the area would have to be exposed if there is any slightest doubt that this fault exists.

Masts & spars (alloy)

When it is reported that masts and spars have not been inspected because they were stepped at the time of inspection then the report will suggest that these are checked at some later stage. The usual items to check on alloy spars are as follows:

Depending upon the type of rigging attachments used, the areas can suffer through stress and strain and physical fatigue. When T ball fittings are fitted, these are swages fitted to the mast end of the standing rigging, which locate in the mast simply by twisting and turning the free end of the swage. Once in position, provided the rigging remains even slightly tight, these cannot jump out.

However, they are fitted in replaceable stainless steel backing plates which are pop rivetted to the mast. These can often distort and in more severe cases can cause cracking of the wall of the mast at these points. These areas can be repaired by the addition of alloy backing plates however, they have to be checked. Other types of fitments are stainless steel plates, which are pop riveted/bolted to the wall of the mast.

Occasionally corrosion can be a problem between the stainless steel and the alloy. Check these areas for any sign of excessive distortion and/or wear. The other common area where damage can occur is to the spreader roots. Commonly these are stainless steel brackets fixed to the mast and occasionally due to one circumstance or another the spreaders can strain or buckle these. The usual indicators are that the fitting no longer is flush to the mast and there may also be some mast distortion at these points. Any distortion on the mast should be viewed with extreme caution as this could be a natural folding point for the spar.

Generally aluminium masts should have fittings secured with monel metal pop rivets, but it is often the case that aluminium rivets are used and these are prone to corrosion and crumbling and all rivets should be thoroughly checked. It is very common also to find that aluminium pop rivets have the residue of the steel pin remaining in the pop rivets, which can corrode, and at minimum cause rust staining

Stainless can fracture at work hardening points so look for hairline cracking at welds and flex points. Where the anodising coating has failed, usually at the foot of the mast and at places where abrasion has occurred, check for corrosion, which on alloy takes the form of white powdery coating and associated pitting which can be very deep. Unprotected alloy can corrode seriously.

Work hardened & fractured stainless wires at the swage

Expansion takes place and this can easily cause fracturing of socket housings and mast bases (the mast base insert expands through corrosion and splits the base of the mast in serious cases).

It is always advisable to insulate stainless steel from aluminium wherever possible as the interaction between the two metals in sea air is quite destructive to the alloy. There are also one or two inhibiting pastes that are available specifically designed for this purpose.