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PART 2 OF DOCUMENT REF NO. **216/041107**

DATE. **Thurs. 29 November 20007**

SURVEY YACHT **XcXcX**

A survey of the above yacht was carried out upon the above vessel on behalf of the named client without responsibility to any third party or subsequent holder of this report.

CLIENT NAME **Mr. C. S**

FULL NAME OF VESSEL **XcXcX**

PORT OF REGISTRY **Home Port Hamble**

CLASS OR TYPE **Moody 376**

BUILDER **Marine Projects**

DESIGNER **Bill Dixon**

YEAR OF BUILD **1990**

DIMENSIONS		
	LOA	**37ft 10in**
	LWL	**31ft 3in**
	BEAM	**12ft 6in**
	DRAUGHT	**5ft 6in**
	DISPLACEMENT	**7373 kgs.**

LOCATION OF SURVEY **Hamble Point Marina**

CONSTRUCTION

Grp hull, grp deck & supersrturee, fin keel, alloy spars, diesel engine.

SURVEY LIMITATIONS

The vessel was inspected standing on her own keel/s and supported by beaching legs and or bilge supports and wedges.

No through hull fittings were examined other than those commented upon in this report.

No dismantling of any of the vessel's structure was carried out other than those parts of the vessel that would normally be portable or removable for access without the need for tools and therefore any areas that are inaccessible or obscured by the yacht's permanent fittings or joinery have not been inspected and cannot be declared free of defect.

The purpose of this inspection is to inform the client of the structural condition of the vessel as accurately and as comprehensively as access and conditions allow. All reported findings are factual (to the surveyor) unbiased interpretations of the visual indications supplemented with physical tests in some areas where the visual indication may warrant. In accepting this report the client understands that even with the closest of examinations, some defects can escape detection. It is also accepted that different professionals in some aspects of the vessel can draw different conclusions and opinions.

This inspection and report was carried out at the request of the client and their wishes as set out in the survey booking form prior to survey, which forms part 1 of this report, and as such expresses no responsibility or obligation to any other party than the client.

Please Note that this inspection is NOT designed to check any vessel for compliance with the Boat Safety Scheme, as the requirements for this are extremely comprehensive and few vessels built prior to 1998 would be able to conform without major upgrading and/or alterations. All further safety information given in the inspection will be in the surveyor's opinion based upon experience and common sense combined with practicality. For full details of the requirements a booklet is available from 01923 201408 free of charge.

Conformity with any regulatory body or requirement has not been assessed or checked and the client should ensure that the vessel meets with any regulations that, due to size, expected use (professional trade or otherwise) or location by seeking the appropriate inspection parameters and if required, professional specialist confirmation.

For the sake of clarity <u>NO STRIKINGLY OBVIOUS FAULTS</u> means only an overall visual impression has been undertaken of the area. Any fault that would require close visual & physical inspection to identify has NOT been reported.

No opinion is expressed as to the suitability of the vessel for a particular purpose, and the client should make enquiries themselves as to the limitations of the design of the vessel if so required.

Generally no comment will be made upon the original design and structural build detail in the case of professionally designed and built vessels, unless developing faults occasioned by possible building \ design failings are obviously present at the time of survey, the client accepting the original building specifications

Only external inspection has been carried out upon any machinery, engine or electrical installation and equipment, and except where stated, no running test of any type has been carried out.

Without complete removal of all coatings above and below the waterline, internally and externally it is possible that some defects and hidden repairs may go undetected.

No report is available upon the condition, existence, operation or installation of any of the ships inventory, electrical or otherwise unless specifically commented upon. Ships inventory will be considered as those parts of the vessel that do not form part of the structure or have no effect upon the basic designed use of the vessel.

In the case where specific parts of the vessel are not referred to such as upholstery, soft furnishings paint schemes and certain other parts of the vessel structural or otherwise, it should not be assumed that these are free from defect and the client should satisfy themselves as to the condition of those parts.

It is obviously not possible to report upon every aspect of the vessel without stripping or invasive inspection and this report is, in part, designed to inform the client of areas in the vessel where some form of inspection or maintenance will, at some time, be advisable. Many of these areas will merely be preventative measures, it does not suggest faults exist, but at the same time cannot confirm the soundness. It should be likened to gaining a full knowledge of the vessel and those areas, which can occasionally be overlooked during the course of ownership

RECOMMENDATION LEGEND.
*** denotes recommendation is mainly for appearance sake and or long term protection or non-urgent application.**

**** denotes recommendation is not considered urgent at present but WILL require attention or investigation in time, in some cases, perhaps within a season or two.**

***** denotes that these items, in the surveyors opinion, require attention or further investigation before the vessel is considered to be suitable for continued use. Some of those as marked will be required measures to, ensure the vessel and crew's safety and security when in commission, and may not necessarily be structural or detrimental to the value of the vessel.**

Where methods of repair are given, these are in my opinion, possibly the most suitable. I am not suggesting that any or all repairs are carried out in this way, and it is likely that there are alternative options, which may be as good if not better in some circumstances.

At the end of this report is a section describing in more detail some useful information and some common GRP gel coat and laminate faults along with some techniques for repairing them and information on bulkhead problems and repair. They have been included as reference points for client information regarding any grp vessel and this report may refer the reader to this section for further information and clarity. Where the reader is directed to these, the client should take note of the particular area of interest and bear this information in mind and use it as part of the report. The section has been included purely for client interest and is not suggesting that any or all of these faults are present in this vessel. Throughout this report wherever correctable faults are noted both in the description and recommendations, if no precise suggestion on how to attend to this area is made at either of these places please refer to the section at the end of the report where it is likely a full explanation of how to attend to some faults will be located. In all cases, the section should remain attached to the main report in the case where any reference is made to it.

FINDINGS AS FOLLOWS

I cannot stress how important it is to read **all** of this report as a great deal of information/advice is given that could have far reaching effects if not fully understood and, in some case, not acted upon. No responsibility can be accepted for failure to note and act upon certain information/suggestions/advice. Please contact the surveyor when any uncertainty arises from information and advice contained here. All advice is given in the client's best interests and no other party.

HULL EXTERIOR.

Description hull above waterline

XcXcX appears to be a production line model of the Moody 376. This particular example was reported as being built in 1990. The design comprises of a modern fin keel centre cockpit cruising yacht with a hull of moderate height freeboard, relatively straight sheerline rising slightly toward the bow. Noticeably raked stem and wide forward sloping transom with slight sugar scoop. The vessel is typical of the modern type of configuration. Various Moody styling lines attached to the hull. Wide beam with considerable width transom. Centre cockpit configuration, good size working foredeck with coach roof, wedge shaped and rising from the deck in one long continuous moulding with wide side decks running past cockpit to low after cabin moulding with short after deck. Single mast stepped on coach roof. Two row perimeter guardlines, pulpit and pushpit.

topsides

The vessel was located close alongside another vessel on a selling aisle and, access to the amidships section on port was physically virtually impossible due to lack of clearance being only, at its smallest, a few inches however, the majority of the topsides were inspected and found to be original white gel coat in a highly polished condition. No sign of knuckling or other distortion and no strikingly obvious areas of previous structural damage. There were no outstanding areas of non-repaired structural damage. The gel coat condition appears to be good and, considering the age of the vessel, is free from any substantially obvious scarring or scuffing other than one or two minor scratches which are limited to the gel coat, scattered here and there on both port and starboard topsides. It is also thought that 75% of these could be carefully obscured with normal cosmetic preparation. The typical Moody class decals are fitted and, these are also in good cosmetic condition although it was noted that on port, some of the contrasting pale blue vinyl striping has faded somewhat.

transom

The transom is in similar condition to that of the topsides although it was noted that there is a localised area of significant gel coat chipping on the port transom corner top and, on the opposite starboard corner there has been a localised repair carried out. Neither of these is considered of any structural consequence, although it would be wise to attend to the deeper gel coat chipping on port corner. There is also some mild scattered chipping of the gel coat along the vulnerable edge of the sugar scoop, again, none of this is structurally significant. A stainless steel boarding ladder is fitted centrally, this could not be unfolded due to the location of the boat against a walkway however, it has the appearance of being sound and well secured.

stem

Sound, no strikingly obvious faults.

rigging chainplates

These are stainless fittings secured to the deck/superstructure moulding. It is only possible to report upon the exposed parts of these. Part of long-term maintenance upon any vessel is the inspection of the under-deck parts of these by removing any panelling as required and ensuring the supporting blocks/reinforcements are sound.

backstay fitting

This is a stainless strap secured to the transom. No inspection has been made of the retaining fastenings as access is restricted, however, this is a substantial strap held on with several bolts and no strikingly obvious signs of movement or deterioration.

stemhead fitting

This is a substantial stainless steel stemhead fitting with forestay attachment point, twin anchor bow rollers both of which are slightly tight to revolve, anchor stock retaining pin and stem tang. All in sound condition and free from any strikingly obvious movement.

rubbing strake

None fitted.

RECOMMENDATIONS

1. One or two deeper scratches and scars on the gel coat of the topsides might benefit from further treatment, in this case, I would probably suggest locally rubbing the areas down with 600 grade wet and dry on a block gradually finishing with 2400 grade and then polishing back with cutting compounds and glazing fluid, I believe this will eradicate most of the deeper scratches.*
2. The gel coat chipping on the port top corner of the transom would benefit cosmetically for long-term retention of value and prevention of further deterioration by application of gel coat filler or, alternatively polyester type filler which is carefully faired back and then touched in with precisely matching two pot polyurethane paint *

At the end of this report is a section explaining stress cracking causes and methods of repair, please note this area and include it as an extension of this section. Topside and/or underside hardspot cracking can sometimes be a consequence of excessive hull working in a seaway or under high stress and twisting over bulkheads. This should always be considered if it is known that the vessel has not been subject to impact or contact damage at suspect areas. This defect does commonly affect vessels that have been used for sustained open sea voyages if the construction is in the slightest way weak in either design and/or skin strength.

hull below waterline description

The below waterline configuration is typical for the vessel type and comprises of a single fin keel, this is iron and is suspended in the conventional way with nuts and studs internally. Single prop shaft supported in p bracket turning forward of the rudder, skeg supported rudder. Relatively deep sections as the vessel is primarily designed for cruising with a fin keel of moderate/long length.

hull body

Generally where visually noted any suspected gel coat stress crack will be reported as in my opinion, ANY underwater gel coat stress crack must warrant further attention and concern than a similar crack that may be reported as merely cosmetic on the structure above the waterline.

Viewing the vessel from various different angles indicated no distortion, knuckling or other unexpected unfairness of the hull.

The vessel has been recently coated with blue antifouling to good standard. The antifouling has not built up to any great degree and the surface appears to be quite smooth.

When a vessel has been painted immediately prior to this inspection, this painting can obscure some gel coat damage and hairline cracks. These areas of damage will usually be indicated once the vessel has undergone a season afloat and the coatings have hardened which allows the crack or damage to be visually noticeable.

The antifouling was removed in various random areas and this revealed what appears to be an epoxy coating, this is an off white colour. This epoxy coating was reported as having been applied following a previous survey in 2004 when it was reported that at that time, in the surveyor's opinion, the hull was suitable for epoxy coating. Obviously I am unaware of the circumstances and details of those particular findings.

This coating was not damaged in order to inspect the underlying original gel coat or laminate and unfortunately I cannot report the visual condition of this gel coat/laminate or the condition of the laminate prior to this coating being applied. I must point out that epoxy coatings *can* obscure laminate faults such as wicking and limited blistering and occasionally hairline gel coat cracks. Although every effort was made to note any identifiable visual faults through the epoxy where possible, it is possible that the less conspicuous of these faults can escape detection unless all epoxy coatings are removed, which, of course is unacceptable to all in most circumstances. It is only possible to comment on the epoxy coating exposed in regard to whether it has appeared to have fully cured or not and whether or not it appears to be adhering. Generally, without removal it is not possible to report on the overall coating thickness or the standard of preparatory work to the laminate. Unfortunately it is not possible to guarantee the uniformity of application in the areas not exposed.

It was noticed that particular on the port side of the keel, a line running to the keel terminating aft with a large square section directly aft of the keel and running partly down the starboard side of the keel was a slight undulation in the moulding almost where a blanking piece has been fitted in the original mould for a different type of centreline design. This section appears to be quite symmetrical and, hammer testing the area indicated no unusual soundings and moisture meter readings in the area were no different to those experienced anywhere else on the hull. I could identify no weakness with the area, however, I cannot be absolutely precise about its reason for being there as, it was inappropriate for me to remove any of the underlying epoxy which would have possibly allowed me to see either a break in the gel coat if repairs subsequent to original moulding had been carried out or, continuity of gel coat indicating that this was a feature within the original mould however, at this time I am not concerned about the structural effect of this area. The client may wish to make further inquiries from the builders as to whether this was a standard feature of this particular series of hulls.

Around the propeller shaft exit point on the hull there seems to be a rectangular section that is proud of the moulding, hammer testing this area found no structural problems but it was not possible to remove the epoxy for previously noted reasons and, again, I am unaware as to the reason for this. This does appear to be an additional area to original build and, without further stripping down I am unable to comment further.

Further comprehensive hammer testing was carried out throughout both sides of the underside and no unusual or unexpected soundings were recorded.

Hammer sounding is carried out to identify areas of voids, soft or damaged laminate and areas of delamination, but it is not feasible to hammer test every square centimetre of the hull, and it is possible that some smaller areas can be overlooked

In all areas where the antifouling was removed, there were no visual signs of blistering or other disturbance that, at this time, were significant enough to be noticeable through these coatings. This, cannot absolutely confirm there would be no small blisters if the coatings were removed however, given the low moisture meter readings that are later referred to, any small rashes of blisters that may be under these coatings are of no significance as, it would appear that the laminate, at this time, is quite stable chemically.

The client did not require a full and detailed osmosis check as this would require the removal of substantial areas of epoxy coatings which, is totally inappropriate at this time and therefore no detailed information is available upon the activity or otherwise of the internal structure of the laminate. An opinion of the both visual indications, and noted moisture meter indications without comprehensive disturbance of the paint finishes as presented is offered only as a guide to possible further investigation requirements.

NOTE: In the case where the gel coat has been surfaced flat to remove visual signs of osmosis and then overcoated it will not be possible report visual evidence of blistering or wicking, and conclusions will be drawn from moisture readings and soundings and no responsibility will be accepted for blistering that has been knowingly disguised by any party.

moisture meter readings

Where appropriate these were taken using, in this instance Tramex Skipper. At the end of this report is a comprehensive section explaining this subject and the relevance of specific readings among many others in further detail for full understanding/guidance. Please read the appropriate section and include it as part of the text of this report at this point.

A comprehensive set of moisture meter readings was taken throughout both port and starboard underside and these were measured using range two on the above meter (this is the most sensitive scale) and, readings of between 11 and 16 on the 10/20 scale were obtained in the majority of the underside. There were one or two spuriously high readings but, this is not abnormal as, the meter picks up internal structure such as engine bearers and other internal attachments to the hull and often for one reason or another, will give high readings in these localised areas. With readings as low as this, it would be unusual to say the least, to find signs of blistering that was originating from chemical changes within the laminate. It would seem that the application of epoxy was quite likely appropriate at the previous survey.

The rudder moisture meter readings are very high indicating likely waterlogging.

forefoot

Sound, fair in shape, no strikingly obvious faults

skeg

Part of this skeg is an additional section added subsequent to hull moulding and, it is fairly easy to see the slight unfairness of the connection areas of the hull to the skeg. Hammer testing the area indicated no unusual soundings and at this time there was no obvious movement. The skeg assembly appears to be quite substantial.

On many vessels the skeg is not an integral part of the original moulding and is usually an additional member affixed after hull moulding. The method of attaching varies from builder to builder, but generally there are some mechanical fastenings that are subsequently glassed over and inaccessible.

Occasionally these fastenings require checking for corrosion and every effort should be made in forthcoming maintenance schedule to carry out inspection of these where fitted at least once every ten years. Quite often the skeg is hollow and filled with foam, and often the skeg moulding can be subject to internal water retention and laminate deterioration due to osmosis, but fortunately as the skeg is not part of the hull moulding it is not necessarily indicative of the hull condition and if ever required can be treated as a separate unit provided the fastenings can be removed or checked.

skeg lower fitting

This is a significant bronze casting retained with what appears to be copper rivets. No strikingly obvious faults, no noticeable corrosion, no movement.

sternpost

Not applicable.

ballast keel

An iron fin keel is suspended from the underside in the conventional way with nuts/studs internally. When a vessel is standing on its own keel, it is impossible to note any potential movement of the keel/hull join and, particularly on this class, it is not unknown that, when the vessel is lifted, to note some movement in the keel attachment joint to the hull. Conversely when the vessel is lowered back onto the ground it can occasionally be found that the hull settles slightly on top of the keel. At this time, it was impossible to note whether or not this fault or occurrence would exist. I am able to report that there was very little evidence of any movement on port although, there was slight evidence of hull/keel movement on starboard aft evidenced by slight cracking of the epoxy.. It would be safe to assume that this movement will be exaggerated once the vessel has been moved and sailed.

At the time of inspection, the keel/hull join and obviously received some cosmetic attention with regard to filler however, there was no significant gap at this time and there did not appear to be any excessive corrosion emanating from the area however, there is always the possibility that this area could have been comprehensively cleaned and improved cosmetically prior to sale and, possibly will shows signs of disturbance after a few weeks afloat.

It was noted that the forward end of the keel is not in perfect alignment with the moulding and, the keel is slightly set across to starboard. It is impossible for me to comment any further upon this as to whether it is an original build fault or whether the keel has moved subsequent to original build as, it was impractical at this time to access the internal keel bolts/studs at this point, my feelings are that, this is very likely an original build fault.

There is early sign of minor corrosion on the underlying keel surface in one or two places, more so on port low down however, at this time it is very insignificant although, perhaps will be more significant after a season afloat.

corrosion staining?

This covers corrosion staining from anywhere on the visible underbody of the vessel including the rudder. Staining can indicate that corrosion is taking place on internal areas such as rudders and encapsulated keels where fitted and that seawater has entered the internal structure via possible external failings. No such corrosion can be noted if the vessel has been recently painted, or has just been lifted ashore, as this staining usually requires a minimum of 14 days ashore or after painting to show. None at this time, I am unaware as to how long the vessel has been ashore.

twin keels

Not applicable

bilge runners

Not applicable.

rudder

Unfortunately it was not possible to view the vessel directly from astern to check rudder skeg and keel alignment as the staging support posts were directly in the way. Viewing from forwards unfortunately cannot ascertain this.

A substantial moulded rudder, Hammer testing this indicated no cause for concern although moisture meter readings did suggest that the rudder was waterlogged, the rudder was checked for equal deflection both port and starboard and, this was found to be acceptable. There were no signs of separation of two halves although, access to the top face of the rudder is practically impossible and, it was noted that this area has never been antifouled since epoxy coating.

An important section at the end of this report on Rudders is included. Please read this section and use it in conjunction with the following information.

rudder tube, post and bushes

It is not possible to report upon the condition of the hidden parts of this tube, and occasionally these tubes can be prone to leakage internally for one reason or another, and as the vessel is ashore for this inspection, it cannot be guaranteed that this tube is totally free from leakage. All efforts were made to look for signs of previous leakage at this inspection but no obvious indicators were present.

stern gear & prop.

A two blade bronze propeller fitted to a stainless steel shaft, bronze spinner type nut fitted with stainless pin. The bronze propeller is in very good condition and has been recently burnished. A rope cutter is fitted, this appears to be secure. A two blade propeller seldom has the power of a three blade propeller and, on a vessel of this size, it might be considered that in time, an advantage would be gained by the fitting of a three blade propeller if, power in heavy weather is found to be limited.

The prop shaft was not drawn to check for wear. Although not common, the stern tube bonding can fail occasionally allowing movement at its most serious and leakage internally at its least severe. Unfortunately, in most cases this cannot be identified when the vessel is ashore and the client should be aware of this unusual occurrence This bonding can subsequently fail at any time depending upon the original installation and use (line up etc.) or in most cases never give any cause for concern. These can be bonded

originally with polyurethane sealants or resin bonded with polyester resin or epoxy resin. Builders vary in the methods adopted.

"A" or "P" bracket condition

This is a bronze p bracket, secure, it was scraped in various places to check for corrosion and, none was found at this time. It was also noted that a quantity of surfacing filler has been applied on the flange to fetch it level with the hull skin. At this time it was sound and secure with no sign of obvious movement.

prop clearance (10/15% prop dia)

Adequate.

cutless bearing/gland bearing

No movement was detected in the cutlass bearing at this time.

skin fitting accessible faces

All underwater skin fittings are bronze, it was noted that the WC inlet forwards has a strainer fitted, the strainer is noticeably corroded (to the extent that one of the filter bars has broken off due to corrosion) and requires replacement. At this time I cannot be certain if the underlying skin fitting also requires replacement or if it is part of the same skin fitting, however, either way it requires attention. The remaining skin fittings are all sound. There are several skin fittings fitted on the waterline, these are also bronze.

It should not be assumed that because the outer faces are found to be reasonably sound, the hidden part within the hull skin is also sound. There is no method of assessing this area without removal.

in number

5

anode/s

One shaft anode is fitted this is approximately 30% eroded however, once these get to approximately 50% eroded they become loose on the shaft and, more of a liability than protection. A larger pear shaped anode is fitted on starboard aft bilges. This is approximately 25% eroded and possibly suitable for at least a further season.

wired

The bilge anode is wired to the stern gear and the skeg with low resistance circuitry at this time however, internal inspection showed that there is a moderate degree of corrosion around the wiring attachment points of the bolt of the anode and, it might not be long before a resistance builds up within the circuitry.

It has not been possible in this relatively short inspection, to assess the watertight integrity of the hull, and enquiries should be made and noted from the previous user or keeper in this respect.

RECOMMENDATIONS

1. Any developing external rust on the ballast keel can be treated with a commercially obtained rust killer (Fertan is one) and sealed with an epoxy coating to increase the protection. Never apply copper based antifouling to any steel or iron assembly without first applying a barrier coat. Copper reacts with ferrous causing early rusting to occur. **

2. It is advisable to remove, inspect and if required replace propeller retaining nut. The reason for this is that the hidden threads on the nut can deteriorate without visual warning, allowing the prop. to pull off in some circumstances when driving hard astern.**
3. In my opinion, it will be wise to remove the forward WC inlet skin fitting and, further inspect and likely replace if the strainer is part of the skin fitting. ***
4. Although the shaft anode still has a degree of material left, as previously noted, it is unwise to allow these to erode beyond 50% as they than become loose on the shaft therefore, it would be a good precaution to replace this prior to commissioning considering the relatively inexpensive cost. **
5. Attend to the internal wiring connection on the inside of the anode fitted to the stern bilges where corrosion is obviously present. **
6. For client information and clarity, he might want to make enquiries from the original builders as to whether the hull mouldings had the option of a different type of insert used for the centreline area on variations of the hull which would explain the slight uncertainty in this area as, this is likely to be mentioned in future pre-purchase structural surveys *
7. It should not be assumed that epoxy coatings will protect any vessel for ever and, to this end, it is strongly suggested that the vessel has new sets of moisture meter readings taken every other season which can then be compared with the readings obtained in this report which will give an indication of early failure or deterioration of the coatings. *
8. If power is found wanting in strong head to wind conditions at sea when under engine alone, it might be considered worth making inquiries as to whether a three blade propeller of the right pitch & diameter would improve the situation. *
9. When the vessel is lifted for launching or any other purpose, if possible, either be there to note any movement when the keel is suspended from the vessel or ask an agent to note any movement in the keel at that time. This can sometimes be caused by the internal nuts becoming slightly loose due to corrosion taking place on the Square plates beneath the nuts which are in effect, become slightly thinner. *

At the end of the report is a section dealing specifically with osmosis, underwater stress cracking, hard spots and epoxy treatment problems along with keelbolt/keel problems and seacock information. Please note this section and include the information as part of the report.

Note: When checking for corrosion on bronze fittings and fastenings in future checks, look for signs of dull coppery patches on part or all of the assembly. It will be found that these areas are soft and easily scraped, the material is brittle and chips easily. This is a good indicator of corrosion and all bolts and nuts that have the slightest indication of corrosion should be replaced. Other fittings that show limited corrosion should be further investigated to assess the degree of deterioration and whether the item is suitable for continued use. When drilling sound bronze, the metal will spiral from the drill in reasonable long lengths, when drilling corroded bronze, the waste material does not spiral it will usually be chips and powder.

DECK AND COACHROOF.

description

Typical layout for a modern fin keel cruiser comprising of moderate size working foredeck gradually blending in to wedge shaped coach roof moulding with wide side decks extending past central cockpit and after cabin moulding to short after deck. Two row perimeter guardlines. Various ventilation /access hatches throughout the structure, additional safety railings for support fitted around the mast. Pulpit and pushpit. Mast stepped on forward end of coach roof.

Limited size spray hood for cockpit protection. The vessel is fitted with a life raft although, it appears the life raft last service was carried out in 1998 which, is very likely now overdue for re-servicing.

superstructure & deck

A substantial structure in original white gel coat with contrasting colour (pale grey) non slip areas moulded in. Typical decals fitted to coach roof sides all in good condition although somewhat faded on port side. Walking around the deck and superstructure indicated a deck of considerable rigidity with no noticeable flexing in any area. Hammer testing the area comprehensively indicated no areas of core bonding failure at this time. However, on close inspection in two or three areas of the forward coach roof top there could just be seen hairline cracks in the non slip finish. One pair of hairline cracks could be seen just aft of the main fore hatch, one running across the vessel to port and another running across the vessel to starboard. The one on starboard ran at a slight angle aft, Hammer testing this area indicated a hard spot at precisely this point, internal inspection indicated one of the bulkheads for the WC compartment directly beneath which also ran at an angle aft. At this time I do not think there is any major structural effect however, I do think that perhaps it is an area that would be susceptible to hard spot cracking and, this could be the very early signs that hard spot cracking will further develop in years to come. The other cracks which were similar in visual looks but free from any hard spots, are not so easily identified as to their cause. These are noted as being just aft of the smaller ventilation hatch forward of the mast. One possibility may be that they are in areas where the underlying core has got butt joints if that core is plywood or some other sheet material and, again, this is an area where flexing might have taken place and would be more referred to as hinge stress cracking. These areas were checked with the moisture meter and, at this time, there were no significantly different readings to any other part of the structure, which, generally suggests that moisture has not found its way into the core at this point and that the laminate locally is still dry. However, although I do not believe any works at this time are justified, I do believe that they are areas which will have to be monitored due to the risk of them developing further. The hairline cracks will not disappear and one cannot take the risk of water entering the area at some stage.

There is a degree of stressing occurring round the moulded plinth for the spinnaker/genoa sheet turning blocks on the aft side decks on both port and starboard. Again, I do not believe there is any need for attention at this time however, they do suggest that the areas are highly stressed and have flexed which would not be unexpected.

There is the facility to store a life raft on deck, the life raft at this time was stored below decks and is a canister type however, it appears to have been a substantial time since it was last serviced.

Warning

Any life raft stored below decks should be regarded as a potential hazard as, if the operating lanyard is strained accidentally, the life raft will inflate and will cause major structural damage and potential serious injury it is therefore strongly suggested that when possible, keep the transport of liferafts within the vessel to a minimum and always store on deck.

It is quite common for fibreglass deck mouldings to develop minor gel coat stress cracks and often they are of limited structural consequence and although not desirable, occasionally inevitable on vessels over a certain age.

The majority of the stress cracks have been reported above, particularly those that are near structurally loaded areas but some lesser areas have not been individually listed as they are considered insignificant to the value, saleability or soundness of the vessel.

Cored decks and structure are further described along with occasional problems and rectification methods in the section at the end of this report. Please refer to this area and include it as part of the report where relevant.

windows and surrounds (glass or perspex)

These are tinted Perspex or acrylic glass in alloy frames. All in relatively sound condition although it was noticed that some of the frame seals appear to be much older than others and, in the case of the older frame seals I believe there is some hardening and deterioration. The older ones appear to be the port after cabin seal, and the port forward cabin window seal.

hatches

Various access and ventilation hatches are fitted, these are all acrylic glass in alloy frames and all in operating condition although it was noted the main access forehatch is slightly worn at the moment in that it is not self-supporting in part of the opening range which it once was when new. All are fitted with operating internal levers and locks. There are degrees of UV crazing on all of the windows extending from moderately severe to light crazing. It is likely that in the course of time, those with the more severe crazing will benefit from replacement, amongst these would be the aft cabin hatch insert. However, no immediate action is required but this will be an eventual requirement and should not be ignored.

A gas locker is fitted on the port side sidedeck close to the cockpit, this has a hinged hatch lid and it was noted that the seal for this lid is gradually becoming detached. There is no immediate consequence of this other than a quickening deterioration of the components such as the regulator within the gas locker due to exposure to occasional seawater.

The main sliding hatch is a tinted Perspex hatch with teak trim in good condition. One single teak faced plywood drop board is fitted with a conventional swing lever lock. The drop board is structurally sound however, the teak facing externally has been thinned to excess. The teak veneer of modern plywood is, in most cases, excessively thin and will not take any sanding before the underlying base ply shows through which, is the case here.

toe rails

These are alloy extrusions in good condition and well secured. The numerous fastenings for these also act as mechanical fastenings for the hull and deck structure connection.

rubbing strakes

None fitted.

stanchions and bases

These are alloy stanchions fitted in alloy bases, all good. Sound and secure.

pulpit and pushpit

Good quality stainless steel tubular pulpit and pushpit all well secured and sound.

guardrails

Stainless steel guardlines of unknown age, quite likely as old as the vessel, no strikingly obvious faults although, visual confirmation of the structural strength of stainless steel is not possible and, generally these do have a somewhat limited lifespan, or at least a limited lifetime of absolute reliability.

deck hardware

The vessel is fitted with alloy cleats and alloy fairleads incorporated into the extruded toe rail sections. All sound and secure.

Unfortunately it is not possible to confirm the size of the backing pads for the load bearing deck fittings, and it is not uncommon for builders to fit undersized pads in some areas which can load the structure excessively at times. It is wise to undertake a check of some of the support pads for these fittings for peace of mind by removing the linings where required.

It should be noted that often alloy cleats and hardware when fastened with stainless steel is usually subject to a degree of corrosion at the point of the stainless steel/alloy junction to the extent that it sometimes becomes impossible to remove stainless fastenings from alloy without damaging the alloy and occasionally expansion cracking can occur to alloy parts due to this corrosion.

handholds /grabrails

A mixture of teak handrails secured to coach roof in good cosmetic and structural condition, stainless steel handrails fitted on the after cabin, sound condition, stainless steel handrails fitted on port cockpit area also sound and some support railings around the mast in stainless steel which are also sound and secure.

sail tracks

Alloy tracks fitted with running genoa cars, all sound. The cars are free to run on the tracks and lock in position where required.

stemhead fitting

This has been referred to under **hull above waterline.**

tabernacle(s)

This is a conventional alloy cast mast base in sound condition well secured.

shroud "u" bolts

These are substantial fittings exiting the side deck, it is believed that they attach to webs bonded to the hull below the side decks although, these areas are completely boxed in with joinery and as such are completely not accessible in any non-invasive inspection. The exposed parts are in good condition and free from obvious movement or deterioration.

deck deflection sidedecks

This is where the upward lift of the rigging attachment points distorts the deck locally in the area. Although undesirable it is common to have a degree of deflection here.

On starboard side slight, on port side negligible, at this time the distortion would not be considered excessive.

baby stay

This is an area that is highly strained on any vessel fitted with this design and very susceptible to deck straining. At this time, no significant distortion was noted.

deck deflection mast base

Quite often this area on many vessels is reinforced with a pad of plywood or similar set into the moulding recess and then laminated over internally. This is a vulnerable area for water ingress because of the fastenings for the mast base mounting that can leak. The result can be deterioration of this filler pad allowing a degree of distortion of the base because of lack of support. It is not possible to confirm the condition of this area and future checks would include noting of any water seepage from the bolts if accessible and mild distortion when the rig is tensioned. Checks were made upon this as far as possible in this inspection.

At the time of this inspection, it was noted there is a slight settling of the area however, this would be within acceptable limits being approximately a depression of three millimetres.

backstay fitting

This has been referred to in **hull above waterline.**

navigation lights

One stern light is fitted on the pushpit, one bi-colour light on the pulpit, mast fitted steaming light and incorporated deck light. It would appear that the vessel is fitted with a masthead light but, this could not be viewed. All low lights were working with the exception of no information available on the masthead light.

anchor(s) and chain

A Bruce pattern anchor is shackled to a good scope of approximately eight millimetre chain, the bitter end is connected with a lanyard exiting the hawse pipe made fast to the structure below. The chain is in structurally quite good condition however, the first 18 in. or so has deteriorated due to the galvanising coat having been eroded and, throughout the scope there are sections of two or three links where the galvanising coat has been abraded or worn and superficial corrosion has set into the links. The chain might be regarded as slightly underweight for the vessel if serious cruising were to be envisaged.

It was noted a manual anchor winch is fitted in the anchor well locker, this was in working condition but will probably benefit from service however, it was noted that the steel backing plate fitted to support this below decks is corroding significantly.

At the end of the report is a table of suggested minimum weights of anchor/chain/warp.

spare anchor

None seen at this time which, would be unusual on a vessel of the size

RECOMMENDATIONS

1. With regard to the noted hairline cracking across the top of the coach roof and in particular the suspected early sign of a hard spot crack on the starboard side of the coach roof just aft of the main fore hatch, although there was no suggestion of structural failure at this time, because the crack is coinciding precisely with the position of the underlying bulkhead, it is likely there is a definite connection and, to this end, although no work is suggested that this time, there has to be the risk that over the course of time this area could further develop that would require some structural/cosmetic works. Any works carried out in this area would have to be done to a particularly high standard if they are to be invisible and, on a vessel of this calibre and present condition, the knock-on effect of a decrease in value would be quite noticeable if these repairs were less than 100%. It is suggested that a sum is put aside for this eventuality and that a constant awareness of any changes in the area is kept. It is imperative to ensure that if any cracking that allows water into the core does develop, works are carried out immediately as, any core contamination can be very destructive to the structure and, consequently extremely expensive in the long-term. There is a long section of explanation with regard to cored decks at the end of this report, please refer to this further. **
2. Replace the backing plate or at least remove the backing plate under the anchor winch and further inspect however, it will probably be beneficial in the long-term to replace this with a stainless steel plate. **
3. The gas locker lid seal would benefit from reattaching, as, as noted, any seawater entering this locker will quicken any deterioration of the gas components including the regulator. *
4. With regard to the anchoring scope, if the cruising is likely to be coastal cruising and anchoring is not intended to be the prime method of overnight stays or no relatively open water anchoring is envisaged then it is likely the existing scope will still be suitable however, for serious offshore cruising, it is likely that the anchor scope could be increased in weight to 10 millimetre. The extra weight of 10 millimetre chain will certainly make the vessel more secure and, in areas of long scope, the vessel is likely to be less prone to wandering over her scope. The existing scope would benefit from some attention to prevent further deterioration, it might not be considered worth re-galvanising the whole scope for the sake of a few links and, it can sometimes be successful just treating the occasional link with a wire brush and rust converter followed by galvanising paint by laying the scope out on the ground. As the first 18 in. or so the scope are particularly degraded with regard to the galvanising coat, it is worth just cutting this section off and remaking up to the anchor. *
5. A vessel of this size would normally have a secondary anchor and, even for local coastal cruising, this should apply here. **
6. It is wise to check/increase the size of the backing pads for at least the more vulnerable deck fittings to ensure the safety of the vessel whilst at sea and in port if weather conditions placed unusually heavy strain on these in some circumstances. A vessel can easily be lost if a cleat pulls out for the sake of a section of plywood backing. **

7. Where stainless steel fittings are fitted for rigging attachment points etc, although rare, crevice corrosion can affect these causing excessive weakness and occasional failure. This is not always easily identified as the damage takes place on the hidden parts of the assembly. The most likely areas where damage of this type will occur is where continual deck leaks past these fittings has occurred long term. It is strongly suggested that wherever there is a suspicion of long-term deck leakage, these items are subject to occasional inspection. This damage is extremely rare but unfortunately cannot be confirmed as not being present on any vessel in excess of say 15 years of age. *

8. The sandwich or balsa core type of construction used on the deck must always be monitored for ingress of water into the core, which can eventually cause delamination or detachment of the inner and outer skins. The other vulnerable areas are where load bearing fittings are secured to the deck as these areas should have been originally constructed with non-crushing cores to allow full securing without distorting the mouldings. Unfortunately one or two builders have omitted this in the past and it is not possible to confirm what type of packing is fitted. Any water drips or future distortion of the inner moulding near these fittings should always be checked as this could suggest a future weakness with the security of the fitting. Any unusual creaking or crackling when walking on deck is often (but not always) caused by localised delamination where the bonding of core material (balsa or foam and occasionally plywood) to grp is failing. One way to reinstate this at an early stage is to inject the area locally with epoxy resin by drilling small inlet holes in the area. This type of repair can only be successful if the core is free from water penetration of the core. There are other products available that cure in the presence of water, which may work satisfactorily in some situations. Some of these are manufactured by BONDAGLASS VOSS. In all cases all water ingress must be attended to at an early stage. **

9. The life raft is likely to require a new service if absolute reliability is required. **

10. Although the guardlines appear to be in sound condition, they are of unknown age and, in respect of relatively unknown structural integrity and, it might be considered of value to replace, at very minimum, the topline as this is the one that would be subject to the highest strain although they were relatively heavily strain tested at this time and no weakness was found however, they only break once. Also replace the lanyards as a matter of course as these can suffer from UV deterioration, *

11. The acrylic glass inserts for the hatches are all in various stages of UV deterioration and, as such, will probably require gradual replacement over the course of the next few seasons, the worst appearing to be, at this time, the after cabin access hatch. These inserts can be quite expensive in terms of cost of replacement. The strength loss is very gradual and it is practically impossible to make an accurate judgement on the exact time that replacement is necessary obviously, earlier replacement is better than too late a replacement. **

12. If the self-supporting advantage (which at this time is not fully operating) of the forehatch is important, this will require some attention, the cure may be simple or it may be slightly more involved, at this time I have not gone into the mechanics of the design of the hatch. *

13. There was no indication that the windows are leaking at this time, merely that the seals on one or two are beginning to show signs of age but, it would not be unexpected to find eventually, these older seals start to show signs of leakage. Again, it is impossible to forecast when this may occur but, given the prestigious-ness of the joinery below decks, any leakage from the windows would be very detrimental to the value and the appearance below decks. *

14. If cosmetic perfection is important, there would be no alternative other than to construct a new hatch drop board given that the teak veneer is no longer recoverable The materials can be surprisingly expensive as the new drop board has to be capped & trimmed with solid timber.. *

With reference to all of the above recommendations particularly regarding stress cracking, hard spot damage and cosmetic improvement where noted, there is a considerable amount of extra information contained in the section at the end of this report which may be found relevant in many cases. These use this section to supplement the information as listed above.

INTERIOR

description

The parts of the hull that are not accessible via normal inspection include the area of hull aft of and under the engine, the underside of all deck mouldings where linings are fitted, the bilges that are obscured by the fitted sole and moulding and the inside of the outer skin in areas where inner mouldings are fitted, and I am unable to report that these areas are free from defect. In this particular case, the vessel is fitted with glued carpets in the forepeak and after cabin and these carpets were not removed as this would have constituted cosmetic damage. In the main cabin the cabin sole was screwed down throughout and was only partially removed. As a consequence of high quality build and the desire to obscure any of the underlying hull skin, vast areas of the hull skin are fully lined with plywood, formica and any other cosmetically attractive material and, in most cases all locker backings are all fully lined with this type of material. Also all wiring and pipework is, as far as possible from original build, hidden behind panelling and joinery and substantial runs of pipework and wiring are completely inaccessible to the point that, in some cases, it cannot be seen where particular pipes disappear to and what their purpose is. As a consequence, there are some circumstances that, in the limited time available for report without any invasive procedures into the structure, I am unable to identify some system pipework runs and possibly the standard of some installed equipment.

First impressions are of a vessel that has been well maintained and built to a very high standard with high quality materials throughout. The vessel does not appear to have received a great deal of use up until this point. The layout is relatively conventional and, in this particular case due to the considerable beam, very roomy. It comprises of a two berth forepeak with the facility for a double berth, large WC compartment to starboard, hanging lockers etc opposite to port, main saloon with port and starboard seating/berthing, considerable size galley to port aft, extensive navigation area to starboard aft with walk-through to aft cabin, single berth in this walk-through, prestigious aft cabin with large double berth to port and single berth to starboard, separate heads compartment to port and various vanity units. Good storage throughout beneath berth and within built in lockers

hull interior

As previously noted a considerable quantity of the internal hull skin is non-accessible due to linings however, all removable access hatches and lids were removed and, the overall construction that was accessible from these points appears to be good and sound. In particular, it was noted that under the forward end of the after cabin double berth which is slightly inaccessible, is a quantity of original build debris including a large quantity of fibreglass dust and various detritus from plywood shavings etc which has never been cleaned out. This left over from build detritus, was also seen in one or two other places, which have been infrequently accessed. Generally the build construction is very good and a high degree of focus has been placed upon maintaining the rigidity of the bilges. No strikingly obvious faults were noted in the accessible areas. The skin of the hull under the after cabin double berth on port has been left slightly rough and, if one were to run their hand across, it is likely one would get cut by one or two uneven strands of resined glass protruding from the surface. I believe this area would benefit from painting or gel washing.

berth lengths

These all appear to be of good size, the client having inspected these himself and found them adequate.

hull/deck join

As is usual linings etc. obscure the majority of the deck/hull join and I cannot fully report upon the condition of all of this area. The area is constructed with an internal facing hull flange with the deck planted on top of this with polyurethane adhesive sealant and then supplemented with the toe rail fastenings which are stainless nuts and bolts.

bulkheads

It was not possible to check the total perimeter of all the bonded bulkheads because of lack of access and fitted linings. In order to inspect ALL of these areas, it is necessary to remove some of the linings and this constitutes cosmetic damage to the vessel, which, at this time is not acceptable to the client and/or owner. No strikingly obvious faults noted with any accessible bulkhead at this time.

keel support areas

As is common with many vessels I cannot report upon all of these areas as a degree of inaccessibility prevents total inspection. To access this area fully the whole of the cabin sole should be removed. However, at this time I did undertake the removal of two of the cabin sole panels to attempt to access the mast support area and the area between the forepeak and the main saloon. No other sections of cabin sole were removed as this would have required the removal of table and is beyond the remit of this inspection. In these areas it was noted that the hull has been fitted with athwrtships bonded girder type floors which appear to be quite substantial, particularly the one directly under the mast post. In these limited areas, no sign of deterioration was noted however, this still leaves a substantial area not inspected.

keelbolts

At this time it is not possible to comment upon the condition of all of the keel bolts as, only a maximum of three could be seen. These are studs projecting through the hull with nuts on top. A moderate size square plate is fitted under the nut to spread the load. The areas have been coated with resin.

The square plates appear to be mild steel although not absolutely confirmed but , not unlikely and, in those areas accessed , no excessive corrosion was evident however, this particular class can and does suffer from corrosion of these plates which basically allows a degree of thinning of the plates and therefore in practice, slight loosening of the tension of the nut allowing in some cases keel movement to take place. Within the bilges there was no sign of excessive fresh water laying other than an inch or so of discoloured water directly forward of the engine compartment and, there was no sign of excessively corrosion stained water within the forward bilges which, is slightly encouraging however, until all of the cabin sole bilges have been fully inspected by removal of all cabin sole, precise information is not available upon the possible condition of the keel studs nuts and washers. Although the nuts and studs are resin coated, this coating is brittle and can easily fracture allowing any water that was allowed to lie in the bilges to contaminate and eventually affect the structure of any mild steel, it is therefore important to firstly ensure that any fractured resin is made good with reliable coatings and secondly ensure that water , particularly seawater, is not allowed to lie in the bilges for long periods.

At the end of this report is a section dealing with keelbolts, please refer to this for further information.

floors

This refers to structural floors within the bilges, the main one accessed was the mast support floor and this is in sound condition and quite significant. No strikingly obvious fault was noted with any of the other partly visible floors however, very few of these were accessed.

through hull fittings and seacocks

The vessel is fitted with ball valves throughout the lower sections of hull from the waterline down. These were all in sound and working condition with the exception of one fitted on the port side in the main saloon which was accessible via a removable hatch at the aft end of the main saloon berth, it is obvious this one is seldom accessed as it was seized in the open position. The remainder were all in working condition with good pipework connections with the exception of one pipe connection in the after cabin which, appears to be connected to the basin drain, this pipework is slightly distorted and damaged where it connects to the seacock, the first impression that is that it has been overheated when originally fitted to ease fitting (this type of pipe is far more supple when heated which makes for easier and more successful fitting however, it is sometimes easy to overheat the pipe and therefore cause distortion which I believe is the case here)

There is a section dealing with skin fittings and seacocks and acceptable pipework recommendations at the end of this report please refer to this section for further guidelines and information.

mast(s) support

As noted above, the bilge supports for the mast support appears to be well fitted and well designed. A stainless steel tube of significant diameter is fitted below the mast base under the coach roof. It is not possible to inspect the connection of this tube to the mast base area as the area is fully lined. However, no strikingly obvious disturbance or faults were noted at this time.

engine bearers

Substantial bonded members, free from obvious movement and deterioration.

joinery

The vessel is superbly fitted out from new with high-quality teak and teak face joinery throughout. It is obvious that either the vessel has not received a great deal of use or/and it has been exceptionally well cared for. It was noted the back of one of the chart table draws is missing and, as a result the draw is non usable. The remainder of the joinery is fully functional.

deck beams

None accessible.

deckhead & coachroof

The vessel is fitted with foam back linings on rigid panels, it was noted that the majority of the foam back linings are well secured however, there are significant areas where the foam back linings are becoming detached from the rigid panel and are just hanging although, not immediately noticeable. One of these more significant areas is the port side of the main saloon and one of the panels in the after cabin but, there are other smaller developing areas. The linings are obviously reaching the end of their natural lifespan which is typical for this type of foam back lining.

rigging plate fastenings etc.

Some of these are completely inaccessible and I am unable to report the condition of those.

cooking facilities

A Plastimo Atlantic two burner hob, grill and oven gas cooker is fitted. This is a high quality unit for marine use in good cosmetic condition. It was not fully function tested.

The cooker is fitted in a fully anti-scorch lined cooker bay.

Regulations for new fitment gas cookers includes a requirement for fitted flame failure devices. None of these devices were noted or inspected at this time and I am unable to confirm the conformity of any gas appliance in the vessel. It is suggested that the client make relevant enquiries to CORGI registered operatives if they have any concern regarding gas equipment.

The cooker as fitted was not tested, and no report upon its operation is available.

Most cookers that are combined with ovens have a chimney on the back of the unit to direct the exhaust gasses away from the oven to enable the oven to draw in new oxygen for efficient burning. Although not realised by many, these gasses are very hot and need to be clear of joinery and enclosure by panelling. Whenever this type of cooker is installed or used ensure the back of the cooker has adequate air space from joinery. This also applies to cookers that are gimballed if the gimbals allow the cooker to swing under joinery.

cooker clearance

Adequate

gas system /gas line/gas storage

From the back of the cooker an armoured flexible line connects to a copper line, this copper line runs along the underside of the sidedeck to a storage locker incorporated into the deck on port.

The bottom of this locker has a drain directly overboard to vent the locker. Within the locker are two Calor gas bottles and a rigidly mounted independent gas regulator.

The high-pressure flexible connection hose is dated 1988 and the armoured hose at the back of the cockpit is undated and, quite likely an original fitting. The regulator is showing signs of cosmetic deterioration, which would not be unexpected in its relatively exposed position and is also probably original.

The gas system was NOT pressure tested.

Note. The full safety guidelines for installed gas systems are extremely comprehensive, and few vessels at present are able to conform with all recommendations without extensive modifications to system & structure. It is advised that the Boat Safety Scheme pamphlet (available from 01923 201408) is studied along with the Calor Gas guide as later mentioned if it is required to totally comply with the latest guidelines. The inspection of this system concentrates upon any obvious dangers or faults in the system combined with the practical logistics of storing gas aboard any vessel. The only guaranteed safe gas system aboard any vessel is no system and no gas. Provided care is exercised at all times and good installation and operating practices are adopted then gas is an acceptable risk given the other options available with their associated risks regarding flammable liquids. Whenever any modifications are carried out to a gas system, a "competent" person who is working to a professional standard using professional practice, including leak testing of of finished work, must undertake this work.

fire fighting

All the fire extinguishers aboard the vessel were seen to be out of date with the exception of no information for the halon automatic extinguisher which is fitted in the engine compartment on which the date was not possible to note however, it is likely this is quite old due to the fact that halon is no longer available for sale.

Where extinguishers are fitted with pressure gauges, this is not absolute assurance these will work even if the gauge is reading in the acceptable zone. These gauges are not always accurate. Please refer to the service information on the extinguisher.

fire blanket

Yes, by the galley.

electrical system

In the limited time available in the inspection it was not possible to thoroughly test and inspect every circuit on the vessel, and only a brief inspection was undertaken of visible wires and connections reporting obvious areas of chafing, stretched and loose wires and any obvious visual failings.

The vessel has been comprehensively wired and is quite sophisticated with most of the wiring (but not all) appearing to have been professionally installed, most likely all at original installation. In all places where possible, the wiring has been run behind joinery and panelling and is virtually completely inaccessible. A significant switch panel is fitted close to the navigation area with battery changeover switches and all systems operating switches. As best as possible, all systems were tested at the time of inspection with a report as follows:

- The radar unit was powering up and appears to be functioning although not fully function tested on all settings.
- The VHF non DSC radio was receiving. No transmission test was carried out.
- The domestic entertainment radio was working.
- The refrigerator motor was heard to start although, obviously not run for long enough to ensure its continued working.
- All cabin lights were switched on and it was found that all were working with the exception of the port forepeak light which was not working.
- The converted Decca to GPS unit was powering up and appeared to be working.
- The visible navigation lights were working.
- The engine compartment lighting was working.
- All sailing instrumentation and repeaters including echosounder and log were powering up although obviously not function tested.
- The diesel fired heater was **not** checked for function as this equipment will not be tested unless the owner is aboard which, at this time, he was not.
- The mains battery charger was **not** tested although, this is reported as new.
- The pressurised hot water system was **not** tested, although I can confirm the pressurised cold water system was functioning.
- The Autohelm unit was powered up and found to be operating.

A diesel fired warm air heater with ducted air throughout the vessel is fitted, this was not fired up in the course of this inspection and the installation was not thoroughly checked with regard to manufacturers recommended minimum standards. This unit is fitted in the cave locker on port cockpit and, is slightly vulnerable to physical contact damage with the contents of this locker as, at the time of inspection this locker was completely loaded with various items including inflatable dinghy and associated mast and oars and other very bulky equipment. These units rely upon the constant feed of fresh air and, it is possible that something inadvertently could come in contact with the intake and cause malfunction of the unit.

A **Shark** installed battery charger is fitted under the starboard side after cabin berth, the standard of fitting of this is not particularly high and certainly not to the standard of the remainder of the vessel and is slightly insecure at this time.

A limited mains system is fitted. None of this was checked for good electrical installation and if required, the client should employ a qualified electrician to confirm the operation and installation of all rcd units etc. An RCD unit is fitted in the cave locker on port cockpit with the mains input in the side panelling of this locker.

Also in this cave locker are the connections for the instrumentation for the engine. These are in a relatively vulnerable spot because there is a collection of many wires all terminating on flag terminals on the instruments and switches and, with the loading and storage of long items such as oars and mast components for the inflatable dinghy and various other bulky items, there is in extreme risk in some circumstances of snagging these wires.

In the case as noted later in this report, where it is likely the engine fuel pump connections are taken to this point, this could be catastrophic in some circumstances leading to sudden and unexpected engine failure as might happen when opening and accessing the locker searching for warps fenders etc when approaching moorings.

battery storage

2 x 12 volt batteries are stored within the after cabin compartment under the starboard berth. Both secure. Given the amount of systems aboard the vessel, it might be considered that the battery capacity could be increased although, it is likely that the majority of the time, this particular vessel has been alongside where shore power is available. If shore power is not used or is unavailable, some of the more power consuming items aboard such as the refrigerator and radar etc will have to be judiciously used.

water system and tankage

The vessel appears to be fitted with water tanks under port and starboard main saloon berths, these are virtually completely inaccessible due to being boxed in with joinery and, unfortunately, no reliable information is available upon these other than reporting that the specifications indicate the total capacity is 55 gal. It is likely they are connected with a balance pipe but, again, I cannot confirm this. The vessel is fitted with a calorifier running from the engine cooling system, I am unable to confirm as to whether it is fitted with an electric immersion heater additionally. These units usually have the facility for an internal element but I cannot confirm one is fitted or wired. However, there is every likelihood that one is fitted.

The vessel is also fitted with pressurised water system, this did appear to be working at the time of inspection.

Ice damage can be done to any system over the winter period including WC units and any other water filled system. No direct or close inspection was made looking for any of this type of damage other than any strikingly obvious fault and I cannot guarantee that all pipework and units are free from damage caused by freezing unfortunately. All systems should be drained over the winter period.

W.C. facilities

Two **Jabsco** marine WC's are fitted, these both appear to be in good cosmetic condition and secure although, obviously not tested. A shower is fitted in both compartments and, although not tested with hot water, they did appear to be working with pressurised cold water. It is not possible to note how high the pipework is looped to avoid back flooding on the WC's as all the pipes disappear into the panelling however, it is likely that the original builders followed conventional safety guidelines although, this is not absolutely guaranteed until inspected. At this time it was not possible to trace the pipework for the shower drains and, I am unable to confirm how the water from the shower drains exits the hull.

RECOMMENDATIONS

1. With the limited amount of water in the tanks, it has not been possible to fully gauge any possible leaks, and the complete system should be completely filled, and checked for correct operation and leakage. At the same time confirm that the drinking water is not tainted in any way through any internal interaction. At this time I cannot confirm whether the vessel is fitted with an electric immersion heater, it would be wise to further confirm this. **

2. Although not structural in the least, the gradual failure of some of the foam back linings will continue and, at this time, for perfection, at least half of the main saloon linings require refitting although, it is likely in the course of time that several of the headlining panels will have to be removed for reattachment of old linings or, most likely the replacement of these linings. Once they have lost attachment, reattaching is particularly difficult due to the breakdown of the foam. If professionally undertaken, this can be a relatively expensive procedure although, fortunately, the majority of the linings can be removed and taken away from the vessel however, these improvements if required, will still be relatively costly at some stage. *

3. Further secure the **Shark** battery charger in the after cabin. **

4. Many vessels use plywood which is bonded into position for bulkheads, rigging braces, engine bearers etc. and plywood can deteriorate unseen under grp bondings when fresh water is in contact for long periods of time, occasioned by deck leaks down rigging U bolts for instance. It is imperative to ensure that all leaks of this type are prevented. Many areas are hidden behind panelling or are inaccessible at this time and as I have been unable to check these areas, all efforts should be made to ensure that these non-inspected areas are sound. Also ensure that where plywood is completely sheathed and then pierced for attachment points such as rigging U bolts, the plywood in the vicinity of the piercing is sound, as this can commonly decay unseen. This inspection is designed to note problems if possible, but as important, suggest which vulnerable areas require monitoring on any vessel to prevent expensive future failure and costs. **

5. Ensure the warm air diesel fired heater in the port cave locker is completely protected from any contact with any of the bulky items within the locker as, any unit which requires constant feed of fresh air and has burning potential must constitute a danger if care is not taken with its installation. ***

6. If recent records do not exist of previously removed and inspected keelbolts it is advisable to remove at least one keelbolt/stud for inspection, as it is not possible to confirm the condition of the obscured parts of these bolts. These can often corrode on the threaded section and the shank lying between the ballast keel and keel moulding without any obvious visual indicators. If the inspected bolt is corroded, then at least another two should be inspected. Occasionally this can prove time consuming and expensive. At this time there was no strikingly obvious evidence to suggest this recommendation is absolutely urgent however, I have taken into account that I have not inspected all of the keel nuts/studs **

7. The firefighting ability of the vessel should be improved, I also believe the number should be increased, an extinguisher should be fitted in the after cabin, one should be fitted in the forward end of the main saloon for use within the forepeak, another should be fitted at the aft end of the main saloon which would preferably be accessible from the cockpit in an emergency. The engine bay automatic extinguisher should be checked for date by unscrewing it from its mountings and checking the date of manufacture and any service information, which is usually written on the extinguisher if it is a modern unit. If no information is available on this unit then it should be replaced with a new more modern unit. When adding new fire extinguishers ensure that they have fire rating of at least 5A/34B (this information is usually printed on the side of new extinguishers) ***

8. Further inspect the slightly damaged pipe connection in the after cabin with regard to the hull seacock as previously noted. **
9. Free off the seized seacock on the port waterline accessible from the port main saloon berth aft end. ***
10. It is suggested that the leaflet L.P.G (BOTTLED GAS) FOR MARINE USE is obtained from Calor Gas on 0800 626626, which gives full information and advice concerning regulations covering gas installations aboard yachts. Flexible pipes of approved type should (recommended less than five years old), this includes the armoured line at the back of the cooker. Any regulator in excess of ten years old is required to be replaced. Whenever any modifications are carried out to a gas system, this work must be undertaken by a "competent" person who is working to a professional standard using professional practices, including leak testing of all finished work. **Note: regulations stipulate that gas appliances that are newly fitted to a vessel as replacement for existing units or additional units must be of current safety standards.** ***
11. Unless one is familiar with the particular wiring system in this particular vessel, which is quite sophisticated, it is difficult to fully understand immediately in the case of urgency. It is suggested recording relevant circuit diagrams with wire colours and fuse positions prominently in the log book or other known position for future reference would be of long-term benefit. Unfortunately, it is practically impossible for a surveyor to fully understand the complete wiring system in the course of an inspection of the remainder of the vessel and it is imperative that the client familiarise himself with the systems aboard with, if necessary the help of the existing owner. Complete familiarisation can take, in some cases, many weeks of use, which is totally impractical to achieve in a relatively short inspection by any surveyor. ***
12. Confirm the 240-volt installation RCD units is working efficiently, has an efficient earth system as well as insulation checks to confirm no electrical losses through the metalwork of the vessel, which can cause excessive electrolysis to stern gear and other underwater metal units. If in any doubt, this may require the services of a competent electrician. **
13. Ensure the diesel fired warm air heater has been serviced in accordance with manufacturers recommendations and is still within maximum period of time between recommended services. **
14. In the case of pre-purchase it is strongly advised that wherever a premium is being paid for included inventory such as electronic equipment, safety equipment and domestic equipment the client must seek demonstration of and in some cases, instruction where relevant (some owner installed installations can be very individual to a particular vessel) of these units to their satisfaction prior to final contract. It is imperative that the client seek assurance from the owner or owner's agent that any items that could not be seen as working due to circumstances of the boat being ashore or any other reason, that these items are also working.

Included within this list where fitted will be electric WC units, electronic navigation equipment (echosounder, speed log, chart plotter, radar, navtex etc) fuel fired warm air heaters, engine calorifier units, installed battery chargers, mains circuitry and any mains powered equipment. VHF marine and domestic radio units, electric bilge pumps, any engine powered equipment, refrigeration systems etc. It is sometimes customary in the case of very expensive items that cannot be tested until the vessel is commissioned or can be fully tested to withhold part of the completion sum if both parties are agreeable. ***

15. Whilst no evidence was noted that suggested any corrosion on the skin fittings was seen, it is not unknown for the hidden section of the skin fitting passing through the skin of the vessel to corrode and weaken the fitting. If no records exist of the skin fittings having been removed and examined within the last five years, it is advisable to carry out checks to these in rotation. *

16. In some cases, the client may consider it worthwhile to commission the removal of the cabin sole/s if applicable for total checking of the area beneath however, this does not usually form part of this type of survey as permission has to be sought from the owner and, generally this would be a yard completed operation, but, in some cases it can give peace of mind for these relatively un-inspected areas where any uncertainty or doubt exists. **

17. I do believe that it is absolutely imperative to ensure the wires at the back of the instrument console within the cave locker can be protected from any risk of snagging or disturbance that would cause disconnection as, as reported at the moment, they are not protected by any boxing or covering. This is given priority due to the implications of sudden the engine failure caused by the simple accidental disconnection or removal of one important wires such as the electric fuel pump wire if fitted in this area. ***

With reference to all of the above recommendations there is a considerable amount of extra information contained in the section at the end of this report, which may be found relevant in many cases. These use this section to supplement the information as listed above.

Occasionally frost damage can occur to engines, seacocks, associated pipework, and any other area where water which freezes could cause damage. This can occur unknown to the owner and only be noticed once afloat in some circumstances. This is obviously more particularly relevant over the winter period when, before a vessel was lifted out it was fine but without undergoing any invasive changes, the next time the vessel is launched at the beginning of the following season there are areas of frost damage leading to loss of watertight integrity in any underwater pipework or damaged ancillary units such as engines and pumps. This damage can occur and not be noted in some cases where hairline cracks in seacocks and pipework etc are beyond what might be considered acceptable normal identification. Unfortunately in some cases it is impossible for me to identify all or any of these areas and it is extremely important for the client/owner to ensure, when the vessel is lifted in the water that none of this damage, if present is allowed to continue and cause consequential damage to the vessel. The client/owner must appoint an agent to ensure the vessel is watertight if he/she is not there at the launch. No responsibility can be accepted for this type of damage however caused. This also extends to other underwater skin fittings/pipework and miscellaneous fittings below the waterline which, when ashore could not possibly be tested and checked for watertight integrity. It is the owner/client's responsibility to ensure these areas are free from leakage when afloat.

Always ensure that all seacocks are left open when ashore to limit the risk of water lying in the valve, freezing and splitting the seacock.

COCKPIT

description

A substantial centre cockpit with a commanding view over the vessel, there is seating on top of port cave locker and seating on starboard. Further seating running around the aft end of the cockpit. Bridge deck seating. This seating is all teak laid. Mainsheet track fitted on aft coach roof. Various winches for sheets and halyards fitted throughout the cockpit coamings. Substantial diameter stainless steel spoked and rimmed steering wheel fitted to pedestal at the aft end of the cockpit, binnacle type compass on pedestal. Engine controls close by with instrumentation on port cockpit coaming.

steering type and condition

As noted above, wheel steering , the steering was free to turn, no unexpected hard spots or awkward operation no strikingly obvious faults.

steering cables hydraulics etc.

The steering wheel is connected to Teleflex cables, within these Teleflex outer cables a flexible stainless steel wire connects to a substantial quadrant in the after cabin directly attached to the rudder stock. There is a pair of turning sheaves fitted. All of this equipment appears to be of good quality and well fitted. Inspection of the area when the wheel was being turned back and forth indicated no problems with the cables, routing or any other associated common problems. The whole area appears to be secure and free from any deterioration. It was noted the steering cables are partially clipped to one of the engine fuel pipes, and the effect of this is to cause gradual deterioration to both outer cables and the paint from the steel fuel pipe has been removed which is allowing corrosion to set into the pipe. This should not be allowed to continue.

A square has been formed on top of the rudder stock which would allow the connection of an emergency tiller although, at this time, the emergency tiller was not encountered within the vessel.

sail control

All halyards are bought back to the cockpit and fitted with halyard jammers. There are substantial winches fitted for the sheet winches, halyard winches and the mainsheet winch. All appear to be good quality, it would be usual to carry out servicing to these winches prior to full use.

bilge pump(s)

At this time, only one manual bilge pump could be located. This is fitted in the port cave locker with an associated handle stored close by. The run of pipework from this to where it is believed the intake suction pipe in the bilges is fitted, which is just forward of the engine, is thought to be exceptionally long although, it was not possible to trace the pipework for all of its length as it disappears into the structure behind joinery for substantial lengths and, there is no absolute certainty that the pipe discovered at the forward end of the engine is the same pipe. The end of this pipe was immersed in approximately 2 in. of water and should have been able to draw this water up however, all attempts to draw this water up using the existing bilge pump failed. I am not sure as to the precise cause of this but it is likely that it is due in part to the very long length of

suction pipe and in part due to the flap valves within the pump being dry. I do believe this requires a degree of investigation to confirm the findings.

A short length of pipe, even with slightly leaking valves due to their dryness will still be effective at creating enough vacuum to prime the pump but, obviously much longer lengths of pipe impair the vacuum considerably. It was also unusual not to locate an additional pump within the vessel at this time.

There is a possibility that an additional pump is installed within the structure somewhere as, large areas of the structure particularly beneath the main cabin sole and aft cabin sole which could not be removed have not been inspected and there is every possibility that an electric bilge pump has been additionally installed however, no switches or obvious pipework for this was located.

cockpit condition

The cockpit condition is very good. The teak decking is secured in all places with the exception of one loose plank (not visually identifiable) on the starboard cockpit seating in a section close to the cut away that is required for the wheel to turn. This has possibly been loose from almost new.

A spray hood was seen within the cave locker on port, this is structurally sound but, considered slightly scruffy when compared to the remainder of the vessel.

cockpit drains and pipes

There are two cockpit drains fitted in the aft end of the well, these appear to be connected to one another and are directed overboard on port side just above waterline.

pipes crossed?

No.

RECOMMENDATIONS

1. A degree of further investigation is required into the workings of the manual bilge pump to ensure that firstly it is connected to the pipework as suspected that terminates in the bilges just forward of the engine and secondly, as to why the small amount of water within these bilges could not be pumped out with this pump. It may simply be that the pump has been inactive for a considerable length of time and the valves have become temporarily stuck however, the vessel should not be assumed to be fully commissioned until this has been comprehensively checked. ***
2. On a vessel of this size, it would be strongly suggested that an alternative method of pumping the bilges is available in case of primary pump failure if it is the case that only one bilge pump is fitted.. This can be an electric pump, an engine driven pump or another manual pump. **
3. If the teak plank on the starboard cockpit seat becomes noticeably looser then it may be possible to drill an access hole of about 3mm in the teak within the area that is loose, use a hypodermic syringe to flood the area with an adhesive such as epoxy and merely open the hole up large enough to subsequently replug the area. *
4. The steering cables should be both protected and prevented from causing any further damage to the steel fuel pipe. They also do have to be restrained and it may be better to sheath these in a section of split rubber pipe of adequate diameter and then reattach them to a convenient point within the engine bay even, if necessary, reattaching them to this steel pipe provided it remains sound and rigid., although better on a bracket or plate close by. **

ENGINE

The mechanical condition of engines and transmissions are not in the scope of this report and specialist reports should be obtained if these are required. The observations below are made with limited investigation only.

description

The engine is a Thornycroft T80 D four cylinder diesel engine, the engine is thought to be basically commercial engine which has been found suitable for the marine market and professionally marinised. This tends to be an advantage as there are more units available throughout the world and therefore there is more knowledge and perhaps more significantly, spares are usually more easily obtainable at a more economic price than any dedicated marine engine.

First impressions of the engine are of a relatively well maintained unit although, it is suffering from scattered areas of corrosion on the castings which, considering its very protected position almost within the accommodation, is surprising. One slightly concerning area of corrosion was noted on the forward port sump corner. I cannot be sure how thick this sump is but it appears to be a pressed steel sump and, in some cases these steel sumps are relatively thin and will not in endure a great degree of corrosion without pitting and leaking. There were no leaks at this time but, access to this corner of the sump is quite difficult.

It was also noted that the original mechanical fuel lift pump has been removed from the area and exchanged for a bulkhead fitted electrical pump. Close inspection of the original position for this mechanical pump shows that a blanking plate has been fitted, this is a metal plate but it has been fitted with silicon sealant and one of the two retaining bolts have been packed out with numerous washers. There was no leakage evident at this time. Presumably, the original pump could not be refitted due to problems with the threads on the casting however, I do not know the precise original problem but, I imagine that it would be impossible to revert to the original mechanical type pump otherwise this would have been done. It is rare to find older style diesel engines fitted with electrical fuel pumps as, this slightly reduces the absolute reliability and increases the reliance on electrical units. There is every possibility that the corrosion that is affecting the sump may have been a result of some water leakage from the water connections in this area that possibly were also responsible for the consequential reasons that the fuel pump could not be refitted. There are also localised areas of corrosion where the paint coatings have failed on number four injector and here and there throughout the less accessible parts of the unit.

The local maintenance engineers were assigned to start the engine for a short running test and this was carried out whilst I was aboard. It was not possible to run the engine for more than approximately 45 seconds due to the fact that the cooling water which was in a portable bucket was drawn up within that timescale however, I can report that the engine did start albeit not quite as easily as might have been expected with a diesel engine. Once fired the engine ran smoothly firing on all four cylinders and revved freely. I was not in a position to note the oil pressure at that time due to the fact I was watching the engine and those controls and indicators were up close to the helm. I do not have any information as to when the engine was last run however, diesel engines can stand for quite long periods and, provided glow plugs/heater plugs are working and fuel is within the system, will start up in most cases provided the engine is sound as easily as

if they had only been started the day before. The weather was not particularly cold, cold atmosphere can impede starting of diesel engines.

It may be that it required a degree of turning over before the oil reached the piston rings thus increasing the compression however, the drainage of oil from the compression rings is a function of time to a degree.

engine mounts

Limited access prevented physical testing of the bonding of all of the engine mounts, but visually no obvious faults were noted. However this cannot confirm that all of these are structurally sound as it has not been possible to apply leverage to them to note the degree of engine lift and thus the check bonding of the rubber/steel. At this time there were no strikingly obvious faults with the engine mountings and, when the engine was running, the engine was stable.

It was noted there is a degree of surface corrosion around the aft port engine mounting.

All engine mountings will deteriorate when in constant with diesel fuel & engine oil.

battery storage and battery state if applicable

Please refer to **accommodation**

siphon break

Due to the complexity of the pipework installation, the siphon break if fitted was not immediately obvious. The purpose of a siphon break is to prevent cooling water siphoning back through the system when the engine is stopped and filling the exhaust manifold and possibly the cylinder(s) under certain circumstances. Not all installations require a siphon break, but enquiries might be considered as to the relevance in this installation.

fresh water\raw water cooling

The vessel is fitted with a heat exchanger , it was noted the water level within the heat exchanger was considered a bit low. The antifreeze solution was not checked, catastrophic damage can occur in cases where antifreeze is too weak or not in solution over the Winter period. Ice damage is not part of this inspection.

It was noticed that one of the rubber water transfer pipes to, I believe the calorifier, is abrading in a very localised area on the aft port stud for the engine mounting where it has created a very deep but small cross-section nick in the pipe. It is not possible to confirm the depth of this nick but, it does appear to have entered the pipework by a reasonable distance.

fuel tank & lines

A fuel tank is fitted directly forward of the engine and is installed under the galley work surface. There is absolutely no inspection of this tank possible whatsoever other than the view from a small access panel which appears to be about 7 in. by 7 in. above the tank which gives access to the pipework out connections. I believe the tank is mild steel however, it was comprehensively painted and, none of this paint was removed as, if it was mild steel, this would constitute unacceptable cosmetic damage. In the very small area accessed which, I must report cannot be in any way indicative of the majority of the tank condition, there were no strikingly obvious faults with the condition.

It is not possible to access all surfaces of the fuel tank for inspection and only those faces that are in view can be reported upon.

Where mild steel fuel tanks are fitted, the inspection will be mainly visual particularly in areas where corrosion is evident as, any physical interference with any corrosion on any mild steel tank can occasionally be the last straw in the tank being leakproof due to corrosion pitting and, at the time of this inspection, it is inappropriate to cause any damage to the vessel under any circumstances. Mild steel tanks vary in thickness considerably, the thinner tanks being very prone to failure due to minor corrosion and, unfortunately are likely to be more corroded in non accessible places.

Copper pipework connected to flexible pipework. On the engine the steel pipe from the filter to the engine injector pump is showing signs of corrosion due to the abrasion of the steering cables as previously noted. This really should be attended to, as, although this is not a high-pressure pipe, it is still only a thin walled pipe and would not be resistant to heavy surface corrosion without pitting and leaking.

fuel filler pipe

No report whatsoever other than noting the deck filler for the fuel tank is on port side deck and the pipework for this appears to be substantial although, it disappears into the panel work.

fuel tank vent

No report whatsoever

fuel filtering

The vessel is fitted with a conventional water separator and conventional cartridge fuel filter on the engine

transmission

No running report available, this appears to be slightly better cosmetic condition than the engine.

drive coupling

A semi flexible coupling, no strikingly obvious faults. A degree of surface corrosion on the exposed steel parts.

prop shaft metal type

Stainless steel.

stern tube & gland

A flexible stern gland is fitted; this is a short section of rubber reinforced tube connected to the stern tube with jubilee clips. There is a minor degree of deterioration on this flexible connector and these are prone to failure due to grease and oil contamination. Once they have failed the vessel has to be removed from the water for replacement so it is always strongly advised to carry out frequent checks and replace these at an early stage if required. It has the appearance of being quite old despite the fact that no serious deterioration could be seen.

greaser fitted?

Yes.

exhaust system wet or dry?

Wet system, it was noted that the short section of exhaust connecting the exhaust manifold to the exhaust box is showing signs of external delamination. This is usually a sign of age.

It is unlikely whether any internal delamination has occurred on such a short section however, it would be prudent to monitor this area. Occasionally on older sections of rubber exhaust internal delamination can occur, this cannot be detected externally but the effect upon the engine can be dramatic. The engine loses power and will not rev because in effect, the exhaust is blocked. Although uncommon, I have included this paragraph for client information for perhaps future reference.

exhaust pipe clearance (hot section)

Adequate.

electrical and mechanical controls

One or two wires were noted as running very close to moving parts, and those wires that are relatively unsupported could become chafed, and in extreme circumstances allowing the wiring to short to earth.

RECOMMENDATIONS

1. Drive shaft coupling bolts to be checked for tightness. **
2. It is possibly not feasible to fit the engine with the original design fuel pump due to a permanent fault in the associated casting now .Provided the electric pump has been installed correctly with absolutely fail safe wiring then I can see no long-term problem however, it is imperative that the wiring for the pump is taken to a position where it cannot be inadvertently disconnected or lose power as, this would effectively stop the engine. At this inspection I was unable to trace the wiring for the pump connections and I do believe that this is worthy of further investigation for future security. If the wiring is taken to the back of the instrument cluster panel on the port cockpit locker as would be expected, as previously noted this is vulnerable to contact damage and disturbance of the wires which further adds to a potential risk of unexpected engine failure. I also feel that the fact that the original mechanical pump cannot be fitted does detract from the value and potential reliability of the engine to a degree as rectifying the situation could turn out to be very expensive depending upon what the damage to the casting is. ***
3. It has not been possible to fully test any of the engine mountings, all attempts should be made to insert a lever under these that would effectively try to lift the engine off the engine mountings, i.e. checking the bonding of the steel/rubber/steel. This may require the removal of some panelling to gain full access. **
4. I believe that the heat exchanger should be topped up with fresh water and antifreeze. I am not fully certain as to why the level in the heat exchanger is low it may simply be a question of lack of inspection recently or, there has to be the possibility of unidentified leakage. However, there were no obvious leaks at the time of this inspection but, I do feel there have been leaks previously, which have possibly affected the engine castings. In the case of fresh water-cooled systems, any antifreeze solution was NOT checked and it is strongly advised that these checks are carried out, renewing any antifreeze preferably. I have also not been able to identify any siphon break, this should be checked.**

5. On a vessel of this age, it is advisable to drain and clean the fuel tank of all sediment to help prevent engine failure caused by blocked fuel lines & filters. Samples of fuel were not taken for testing, and it is advised that all filters are replaced if no recent records of maintenance are available. With this particular tank it will be relatively difficult but it may be possible to remove the flange that is accessible directly under the access hatch and insert a pipe and draw off the fuel from the bottom of the tank which is the most likely place that water and detritus would be settling. **
6. Routine servicing and checking of the cable attachment points and clevis pin retaining pins should be carried out as part of routine maintenance on all cable operated mechanisms before commissioning along with confirming their correct adjustment.***
7. It is strongly advised to carry a back up precautionary measure in case of flexible stern tube connector failure. This can simply be a length of suitable hose cut lengthways with appropriate clips as necessary that in the event of unexpected failure can be temporarily fitted over the existing tube and clamped into position. *
8. The flexible stern tube connector should be further investigated at regular intervals (say a minimum of twice a season) in particular looking for any softening that is/has taken place on the less accessible underside. When these are new they are extremely difficult to depress with finger pressure. Grease contamination has the effect of delaminating the layers of rubber used in the construction thereby being able to easily squeeze the layers back together. ***
9. Prevent any further deterioration of the fuel transfer pipe from the engine filter to the injector pump caused by the abrasion of the steering cables. **
10. Tie back all cables at risk of chafing on the engine and other moving parts with cable clips. This is easily attended to. **
11. I am slightly surprised that the engine did not start as quickly as expected and to this end the engine and transmission should be serviced and extensively run and load tested when afloat alongside before commissioning if records are not available regarding last service details. This includes confirmation that all heater plugs are working and the fuel system is beyond question. ***
12. It is wise to check the water pump impeller for wear and also carry a spare at all times as these do fail at some later stage when run dry as well as normal deterioration which, if no replacement is aboard, renders the engine unusable. **
13. The deterioration to the oil sump on the engine should be further investigated and a degree of care should be exercised when cleaning the sump prior to any treatment of the corrosion. **
14. Where it was noted that one of the calorifier flexible water pipes has abraded on the engine mounting stud, this should be attended to. **.

Note. Occasionally there are maximum times set by the manufacturers of certain degradable parts such as sail drive gaiters out drive gaiters/seals and, in one or two cases, stern tube seals and gaiters. As a guideline these will commonly vary between five and 10 years however it is imperative to ensure the correct time for each particular assembly. It is the client's responsibility to ensure that these guidelines are adhered to because, in some circumstances, any insurer may avoid responsibility for a claim if it is subsequently found that the cause of the claim is failure of an item that was subject to a maximum replacement time set by the manufacturers that has not been adhered to for whatever reason. Each manufacturer sets different replacement times and the client should enquire as to the latest information from the manufacturer regarding the particular item, also enquire as to when replacement was last completed and, where at all possible gain access to copies of the original invoices/ work

MAST(S) AND SPARS

The mast was stepped in position, and as such, only limited inspection was possible, and no comment can be made upon the mast fittings or rigging and its attachments including spreader roots, all standing rigging and its terminations, mast structure and all associated extrusions and fittings that are currently inaccessible.

description

Selden Mast (Kemp Mast label) with in-mast reefing and Boom in Aluminium.Roller Furling Genoa on Furlex reefing system . All halyards brought back to the cockpit

main mast

This is a silver anodised spar of substantial section, it appears that been set up straight and true. It is fitted with internal vertical main Roller furling reefing. It is a two spreader rig and the mast appears to be well stayed. There were no identifiable signs of wall damage or distortion that could be seen from deck level. No obvious signs of corrosion evident from deck level.

mizzen mast

None fitted.

mast fittings

All mast fittings at deck level appear to be sound and in good condition.

booms

This is a silver anodised boom in similar condition to that of the mast. An extending spinnaker pole is stored/attached to the mast on track, this pole appears to be in good condition. It was not removed from its position for full function testing.

spreaders

No report available.

running rigging

The halyards are run inside the mast, and with the exception of the exposed and accessible ends, no report can be made upon their condition. The exposed parts of the halyards appear to be suitable for continued use with a degree of obvious weathering as might be expected.

standing rigging

Standing rigging is all substantial diameter stainless steel. However, it is thought that the rigging is original and despite the fact that there were no strikingly obvious faults with any of the visible cables, it is not possible to confirm the structural integrity any further. I was informed that the rigging was subject to an NDT test at some previous stage however, I am unaware of the findings of that or when exactly it was done. There was no corrosion staining emanating from any of the terminals at deck level and there were no outstanding areas of distortion but it is impossible to detect areas of advanced work hardening or corrosion within terminals.

roller furling gear and luff extrusion

Furlex Roller jib gear, this appears to be in good condition with free turning drum. No obvious corrosion, no obvious distortion.

In most cases, when cleaning the bearings of jib furling gear, it would be rare to use any oil based cleansers or lubricants. Generally fresh water, perhaps with a small amount of detergent would be usual. It should be noted that some of the internal components of these bearings are inclined to swell with oil-based lubricants and cause excessive tightness of the assembly. Always check with the manufacturers recommendations although generally it is safe to use fresh water.

bottlescrews

Stainless steel of substantial size, no strikingly obvious faults.

mast step\s base

All sound, no sign of deterioration or corrosion.

radio aerial(s)

No report available.

navigation lights/other electrical etc.

No report available.

sails

It is not possible to fully report upon the condition of sails because of practical limitations of space and cleanliness and weather conditions. The following comments are only meant to be a guide as to sail condition, full condition assessment if required, should be sought from professional sail makers with loft facilities.

Aboard the vessel at the time of inspection are three sails one furling mainsail, one furling Genoa, and one nylon spinnaker or cruising chute. The nylon sail was not removed from its bag due to the excessive size and impracticality of examining in detail without causing damage to the sail.

The white main sail was removed from the bag and inspected. It is quite clean in condition and reasonably well maintained, there are one or two areas of minor repairs however, it was noted that the UV strip has substantially failed due to UV deterioration and there is a high degree of wear and abrasion on the clew of sail where some repair works are definitely required. There is a general feeling that the sail is somewhat stretched now however, it is probably suitable for further cruising with some repairs.

The furling Genoa is a white sail with a blue UV strip , this is a relatively lightweight sail of substantial size. The UV strip is somewhat faded and, in one or two places rotted with UV deterioration. It was not possible to fully lay out the sail but, no major areas of stitching failure or other deterioration were noted however, again, there is a strong suspicion that this sail is somewhat stretched which would come as no surprise seeing as it is not graduated sailcloth weight which means that it has likely been used in winds that would generally be too strong for its lightweight construction when reefed which is the most common reason for stretching. Windward performance may be compromised slightly if this is the case.

At the end of this report is a section dealing with sail care & problems. Please refer to this area as it forms part of the report

RECOMMENDATIONS

1. The internal halyards should have messengers attached and fed out for detailed inspection if required. **
2. The mast was not unstepped for this inspection, and no comment can be made on it or its attachments and given that it has not been unstepped for close examination of rigging and associated termination points etc. for perhaps more than two seasons it should be unstepped and closely inspected at the earliest opportunity. **
3. It is generally accepted that consideration should be given to replacing stainless standing rigging that is older than about ten years, although of course, it is dependent upon the individual vessel and the use it has undergone. Vessels that are sailed hard or used for racing require much earlier replacement. Bearing this in mind, all rigging that exceeds ten years should be closely checked and all terminations electronically checked or otherwise for corrosion. It must be pointed out work hardened and therefor-brittle cable is not visually easily identifiable until strand breaks are evident. Any corrosion usually takes place between the swage or talurit and the wire that it is clamped to thus being completely visually unidentifiable. NOTE: Individual insurance companies *may* require stainless standing rigging replacement as a matter of course , or an accredited form of electronic testing if it is seen to exceed ten years of age, before accepting insurance risk on some vessels. **
4. Before relying upon both the mast furling and jib furling gear, full testing should be undertaken when practical to ensure that the drum and top swivel on both are in working order under load. ***
5. The main sail does require a new UV strip and some structural repairs to the clew, I also believe that an assessment by sailmaker to ascertain the degree of stretch that has taken place would be beneficial It may be possible to correct the stretch however it is likely the sail is slightly past its best but obviously would still continue to serve as a less efficient cruising sail. **
6. The furling Genoa again, requires a new UV strip although, the UV strip is not as badly deteriorated as the UV strip on the main. A professional assessment for the degree of stretch would also be beneficial but, again it is likely that this sail is slightly past its best. **

With reference to all of the above recommendations and findings of this section there is a considerable amount of extra information contained in the section at the end of this report on MASTS & SPARS which may be found relevant in many cases. These use this section to supplement the information as listed above.

Although the main recommendations of this report are listed at the end of each section, it is imperative that the report is fully read as there may be some reported faults/shortcomings within the text of the sub headings that do not appear under **Recommendations** that, in some circumstances, should be given high precedence and if in any doubt concerning full understanding of the report it is imperative that the client contact the surveyor directly to ask any questions that may be of concern regarding understanding or seriousness of findings before acting upon the content of this report.

GENERAL COMMENTS

It must be considered that some of the findings and recommendations in this report are of limited structural significance and would likely be relevant upon many vessels if one were to thoroughly inspect and report, it is therefore suggested before drawing conclusions, the appropriate degree of concern is attached to some of the relatively non significant findings. They have been included because they exist and I am required to report and advise upon them where possible. This report should be used as a guide to future maintenance as much as anything else and, although there are many recommendations contained within it, it is not practical to expect each and every minor observation to be attended to before the vessel is safe to use. Even new vessels will have details that surveyors will pick up on, and a degree of common sense should be employed when reading this report. Where *** is indicated, it is these areas that should take precedence. Some will be easily attended to without any expense whatsoever, others may require professional help but in most cases they are considered important.

XcXcX is an immaculately presented example of her class and obviously very well maintained with the appearance of having been little used. The vessel does appear to have been carefully used by an experienced owner as, the areas of contact damage on the hull are very limited with few signs of irresponsible/careless handling. There do not appear to be any major structural deficiencies that this inspection has highlighted other than a suspicion of early hard spot cracking on the coach roof deck aft of the access hatch as described under the appropriate section of the report. No significant weakness was noted with this area at this time however, I do believe it is an area where few people will be able to categorically guarantee it will not develop or deteriorate over the course of further seasons, therefore a degree of risk has to be accepted in this area and a sum should be set aside in the case of necessary improvements/repairs as, as previously noted if any works are carried out they will have to be of the highest possible quality to avoid any consequential loss of value of the vessel. Any developments here will have to be corrected with in a very short time of their occurrence as, this is a cored deck and the integrity of the deck cannot be compromised by failure to attend to any developing faults.

With regard to the noted suggestion that a different centreline blanking piece was fitted in the original mould, for clarity, the client may wish to make enquiries from the builders in this respect so he is prepared at some later stage with answers if ever asked when he decides to sell the vessel. **At this time there does remain a degree of uncertainty with regard to this area despite there being no obvious structural deficiency, it can**

sometimes be better to have all the information prior to purchase than find out afterwards.

There is a degree of uncertainty with the engine in that it was both slightly difficult to start in the first instance and, although once started it was running without fault there is the slight decrease in reliability due to the fact that the original mechanical pump has been replaced with an electric pump with the slight complications as earlier noted of the wiring connections within the cave locker directly behind the engine consul. There are also areas of scattered corrosion on the castings which, are probably of no structural consequence provided the engine sump corrosion can be confirmed as non significant into the structure of the sump. Also there has to be a loss of value on the engine due to the likely damage that has occurred to the casting at the fuel pump support and the fact that it possibly cannot be repaired at economical cost, otherwise I am sure it would have been.

It is likely that the sails will still be serviceable (once a degree of maintenance/minor repair has been carried out) however, it is also likely that they will not offer the same performance as they once did as there are various indications that they have been well used despite their cleanliness and external care. I am unaware as to the age of these.

Due to the complexity of the vessel, there is a degree of uncertainty about some internal pipe runs and other system installations which, unfortunately, this inspection has not been able to clarify, it has also been unable to confirm the precise operation of all installations and, as noted throughout the report, the client is strongly advised to go through a checklist of these items with the owner or the owner's agent checking items specifically for correct function. However, this is not uncommon with any modern vessel of high calibre and quality.

I am sure the vessel will go on to give many years of safe and comfortable cruising once any outstanding areas requiring further investigation, and once the prime areas of attention have been attended to.

Among the items that are considered important and should be attended to at an early stage and before the vessel is fully commissioned or used are the following:

- With the owner/agents co-operation or assurance, ensure all inventory regarding electronic, safety, and domestic appliances and units are all working satisfactorily.
- Attend to the engine maintenance issues with checking in particular of the wiring for the fuel pump and ensuring the corrosion on the engine sump is not serious.
- Upgrade the gas system slightly.
- Increase and improve the firefighting ability of the vessel.
- Given that some parts of the vessel could not be inspected due to limited access, it is imperative that these parts are further accessed by removal of any necessary furniture or structure, particularly where hull skin connections are hidden/obscured or beyond physical inspection. I cannot stress how important this particular recommendation is as it is usually these unseen and inaccessible items that never receive the maintenance that is due to them.
- The standing rigging is subject to either age related replacement or electronic NDT testing, although, long-term it is considered that replacement would be the most reliable way forward despite its considerable expense.
- Free off the seized seacock on port waterline aft of amidships.

- Ensure the bilge pump is working and consider installing another if it is found that there is only one permanent installation.
- Protect the wiring behind the engine consul instrumentation panel in the cockpit.
- Replace the corroded skin fitting assembly as required on starboard forwards.

Among the items that possibly require more thought but nevertheless probably will require attention in time are the following:

- When time permits, removal of the mast and full inspection of the structure and fittings.
- Monitor the hairline cracks as reported on the coach roof superstructure.
- Note any gradual movement on the hull/keel joint and reassess the causes if applicable..
- Inspect the internal keel bolts and support plates
- Identify the runs of all hidden pipework and cables for future knowledge of the vessel as, this knowledge is imperative if in the case of any sudden fault one does not understand the system installations throughout the vessel.
- Likely gradual replacement of some of the acrylic glass inserts in the deck hatches.

Where the report notes no access, this means that no assessment is available and it should not be assumed that the area is free from any fault or the area surrounding is free from any fault

All of the aforementioned comments, observations and recommendations expressed in this report are strictly in the opinion and experience of the surveyor and as such, can differ from the opinion of other informed or professional persons.

It is assumed that all further investigations, repairs and or replacements and any other works carried out to the vessel as suggested in this report will be carried out to a high professional standard and will not be responsible for compromising the safety of the vessel under any circumstances.

Whilst every effort has been made to report reliable information in this report no responsibility can be taken for faults latent or not, that remain hidden in either construction and or original design and the client should obtain specialist reports upon equipment or machinery outside the scope of this report to satisfy themselves if that should be the case.

We have not inspected woodwork or other parts of the structure which are covered, unexposed or inaccessible and we are, therefore, unable to report that any such part of the structure is free from defect.

We will not be responsible for any alterations, additions or changes to the vessel after the date of this survey that would affect this report.

Liability is restricted to the instructing client only, no third party liability whatsoever. In the case of professional negligence (the non reporting of a structural fault in those areas of the vessel that would affect the sea-worthiness of the vessel and in an area that was not specifically excluded in the report or reported as being subject to further examination at the client's own cost at a later time or where the remit of the report specified only limited inspection was required) where another professional could have been reasonably expected to report upon it in exactly the same circumstances of this inspection, is limited to a period of one year from the date of inspection. In the case of pre-purchase inspections the financial limitation is a maximum sum not exceeding the final negotiated purchase price of the vessel and will not include subsequent repairs and other expenses whatsoever.

It is the client's responsibility to confirm title of vessel and awareness of any outstanding lien on this craft via normal professional practice before purchase if that be the case and the surveyor accepts no responsibility for relevant undisclosed information.

The surveyor accepts no responsibility for any undisclosed information held by the client that may have had a bearing on the findings of this inspection.

In accepting and relying upon this report the client confirms that he/she has read all of the conditions and limitations contained within it and is acting in the full knowledge of these limitations. The client is also reminded that all observations and comments are in the surveyors opinion only, based upon experience, and inevitably can and occasionally will vary in some cases from other professional bodies.

This report shall remain the property of the surveyor and will not be authorised for any use whatsoever until all payments have been received for the report. Any unauthorised use will be subject to relevant legal claims.

CONTINUED with general GRP structural & cosmetic information>>>>>>>

As noted earlier this section does form part of this report in those places where it has been specifically referred to throughout the text and any areas directly referred to should be assumed as being part of the comment/recommendation section where appropriate It is therefore considered important to fully understand the implications of some of the information contained below.

Note:
There is a legal obligation upon an owner that any answers given that have specific statements about parts of the vessel to specific questions that they may have precise knowledge about such as age of rigging, reasons for repairs in their ownership etc. have to be true and accurate and are legally binding and it is suggested that where the buyer has an unresolved question, the answer given should be noted.

In any cases where a degree of misunderstanding or ambiguity about any conclusion, comment or speculation remains, it is imperative the client contact the surveyor for total clarification of any points. No responsibility will be accepted for actions taken where the client does not have full understanding of the implications of any action taken upon reading the report.

Some common problem identification and some methods of repair with GRP

The following information should be used as a guide only (except where specifically indicated in the above report) as, in many cases, professional assistance may be required to identify and remedy some of the faults described, these following paragraphs have been included for future reference and client information it is not suggesting that the vessel is suffering from any or all of these faults at this time. The methods of repair given are in the opinion of the surveyor only and may very from one repairer to another.

BULKHEAD FAULTS

Broken bondings

When repairing fractured or broken bulkhead bondings there are several ways of repairing these. If the bonding has become detached then it may be possible to drill a series of approximately 3 mm holes in the area of detachment and, with the use of a hypodermic syringe without the needle, inject some catalysed epoxy resin into these holes and flood the entire area beneath the bonding. The use of masking tape or something similar to temporarily hold the bonding close to bulkhead and prevent excessive drainage of the epoxy will help create a good job. Another way of mechanically holding the bondings if they are substantial enough is to use small stainless steel machine screws with large penny washers either side of the bondings at frequent intervals, this combined with epoxy flooding should create a perhaps stronger job than original. If the bondings are ragged, then it is better to remove and start again. It is often suggested that when fitting bulkheads, to leave a slight gap between the bulkhead and the hull as this can prevent a hard spot which can later cause external gel coat and occasional laminate cracks. In the case where the bondings are fractured in the corner close to the hull then this area has to be repaired by fitting new bondings. If the bondings are extremely well attached to the bulkhead and the hull it may be possible to simply over laminate these areas however, this repair is only a strong as the bond of the original bondings. Whenever attaching new fibreglass work to old it is extremely important to fully abrade the area beyond the limits of the new work to ensure good adhesion at the edges. Although it is claimed polyester resin can adhere to old structure provided the preparation is substantial, epoxy resins are more secure and reliable in most cases and epoxy will always have better adhesion to timber whereas polyester resin will have relatively low adhesion to timber.

Decayed bulkheads

In the case of decayed bulkheads, this will usually be close to the edges of the hull particularly at lower parts where fresh water will have remained for long periods and in other areas where freshwater leakage from areas such as deck piercings etc. Occasionally, where loads of the rigging are taken to the bulkhead via metal brackets etc, there occasionally can be unseen decay at the positions of the fastenings for these brackets due to water ingress at these points. Sometimes the report cannot identify these areas due to lack of access or obvious visual indicators so it is always wise to check these areas specifically when carrying out stripping or close examination at these points. The majority of these areas should always be reinstated particularly in the case of main supporting bulkheads. The method of repair and will vary from vessel to vessel and to the degree of cosmetic finish required. In the case of a working boat where cosmetic finish is not so important, it may be possible to merely cut to the area of decayed plywood back to sound plywood and cut larger sections of new plywood that would overlap the existing bulkheads by a good margin and extend to the hull. This area would then be screwed/bolted and glued to the existing bulkhead and laminated to the hull in the conventional way.

In other areas, where cosmetic appearance is important, and any new bulkhead would have to be flush with the existing bulkhead, one method of repairing would be to create a very wide step joint in the bulkhead that is decayed. This is done by cutting back to sound timber and terminating in straight lines.

A wide step joint is created (a minimum of 2 ½ ") where half the thickness of the bulkhead is cleanly cut away which would mate precisely with a new section of plywood which also has a similar step made to be an exact fit. This joint would be comprehensively glued, screwed and bolted where required. The new section of bulkhead will be laminated to the hull and conventional manner.
A simple repair in relatively non stressed areas can be made by cutting the area of damage or decay out any ensuring that the new plywood junctions are in straight lines, cutting an exact section of new plywood to fit in edge to edge, and connecting the new with the old with substantial timber battens fitted either side of the bulkheads over the junction of the old and new. These battens could be screwed and glued to give as much support as possible.
The new section of bulkhead will be laminated to the hull in the conventional manner.
Occasionally where there is too much decay and damage, particularly in the case where the bulkheads serves the support of the rigging, wholesale replacement of sections of bulkheads would be required. Each case has to be assessed individually.

Marine plywood ?

Several types of plywood are available, marine, WBP (water & boil proof), moisture resistant, and interior. The differences come down to structural construction, veneer species and glue type. Marine plywood will generally be produced to a minimum BS standard. This ensures that the glue used is good quality waterproof, the veneers are butted together with a limited number of internal voids (some are allowed), and that the species of timber is reasonably durable. Generally the veneers will be thinner and more numerous which usually makes for a more stable and stronger unit. Unless specified, the finish veneers will usually be plain grained such as gaboon, or other far eastern less well-known species. Various finish veneers are available. However, some of these veneers can be exceptionally thin, especially on some teak finish ply where the veneer is so thin that it cannot be sanded without penetrating the few thousands of an inch thick and exposing the base veneer. Others may have full thickness finish veneers which stand more finishing. On hull planking, particularly close to or below the waterline, then it is advisable to use plywood with as many veneers as possible. The lower grade 6mm has only 3 veneers and the same quality 10mm & 12mm has 5 veneers, the higher grade has a minimum of 5 & 7 veneers respectively. The standard thicknesses are 4mm, 6mm, 9-10mm, 12mm, 18mm & 24-25mm in some grades. To make a custom thickness it is acceptable to bond two thicknesses together with a waterproof glue or epoxy (not polyurethanes as they expand on curing forcing the panels apart)

WBP ply generally uses the same glue as marine ply but is allowed more voids internally, species of timber may be less durable but not always so and there may be thicker but less veneers than marine ply. But these all vary upon the manufacturer, the only consistent will be the glue quality. WBP may not be quite as strong, but for many applications, can be used without undue concern. The cost is considerably less than marine. Various face veneers are available.
MR (moisture resistant) often uses multi veneers of good quality, but the glue used is not sure to resist long exposure to the elements.

Interior ply used to be only suitable for furniture in homes due to non waterproof glue, but now some manufacturers call their plywood interior grade because it has been fully sanded and constructed with multi veneers for high quality applications where a good surface is required and surprisingly, it has been constructed with marine type glues, so can find uses aboard, but ensure the glue is w.b.p. Minimum.

Shuttering ply is not suitable for inclusion in yacht construction as it is low structural quality and rarely stays flat in thinner sections.

All plywood will deteriorate in the right circumstances despite the manufacturers assurances. Generally the exposed edges will be the starting point for water absorption. Also it should not be underestimated that wherever a piercing is cut, be it for a bolt or a window, there will be exposed end grain. It is these areas that should be sealed comprehensively.

On a straight edge, for instance joinery etc. the edge should be capped with solid timber glued into position and on piercings, the exposed edges should be sealed with epoxy resin or at very least paint.
When water enters the laminate and freezes in winter, this will cause delamination.

Encapsulated/non encapsulated plywood backing pads
Most vessels will have encapsulated plywood fitted somewhere within the structure. The usual places are beneath deck stanchions on the underside of the deck, underneath "U" bolt rigging positions if the vessel has sidedeck fitted "U" bolts, cleat positions etc.. In some cases it will not be encapsulated. Either way, fresh water leakage from the fastenings will cause decay and eventual softening and failure if allowed to continue unseen and uncorrected. When the plywood has not been overlaminated, the condition, if accessible, can be easily seen, however, encapsulated ply is a different problem, it cannot be seen and usually there is no obvious evidence. In an important critical area such as rigging U bolts for instance, then a degree of investigation must take place is there is any doubt. Removal of a small amount of overlaminating will not impact whatsoever on the strength here for instance, but would expose the plywood to be able to gauge its condition.

GEL COAT/LAMINATE FAULTS

Brittle gel coat
Gel coat cracks are very common in all parts of many GRP hulls, deck and superstructure mouldings and cockpit mouldings. The causes of gel coat cracks are various and in some cases insignificant in others particularly important. Wherever gel coat cracks are noted there will be a reason for their presence and it should be understood why these are here and, if required, how they can be repaired. Some of the reasons for gel coat cracks are listed below. There is no structural strength in gel coat whatsoever, and within reason the thicker it is, the more brittle it is because the majority of gel coat has no supporting matrix such as GRP cloth or mat.
Many builders use an increased thickness of gel coat in areas of sharp corners, this is sometimes accidental and sometimes deliberate as it is very difficult to to get to the relatively stiff matting to lie in a sharp corner in original manufacture. Any vessel is subject to a degree of flexing and it is inevitable that flexing will occur in areas of corners. With relatively brittle gel coat in a flexing corner it is inevitable that it will show signs of cracking eventually. This type of cracking would be considered relatively unimportant. This is often seen in the corners of cockpit soles to cockpit sides, in the corners of coach roof to deck junctions, quite commonly associated with movement of toe rails where a degree of heavy loadings or impact has taken place. Generally these are an inevitability of any moulding as it suffers the use of continued years. However, occasionally they can indicate that there is failing laminate structure behind them. Assessment on an individual basis with a degree of understanding of the structure will often identify those that are beginning to be of consequence.

"spider web cracking"
Those gel coat cracks the take the form of a spiders web will usually be the result of a localised impact, for instance the dropping of an anchor on deck, the damage would emanate from the point where the fluke hit the deck. Generally this will also be limited to the gel coat but, of course, it depends entirely upon the forces encountered and the rigidity of the deck at that point. Usually (but not always) in the case of severe localised damage such as this the centre of impact will be obviously fractured with gel coat missing and visually obvious damaged, loose and broken laminate. A substantial collision would not be called localised impact.

Hinge effect cracks

This is where, due to original design, a moulding develops cracks in the corners such as cockpit sole/cockpit side, particularly on box type mouldings where the moulding flexes rather like if a hinge was fitted at that corner. Gel coat is usually thick at these points and therefore easily cracked, but if the flexing is too extreme, then sometimes damage can penetrate the laminate. Unfortunately it is often the case that it is impossible to confirm the extent of cracks of this nature other than to say the majority are relatively non serious structurally.

Longitudinal cracking

Longitudinal gel coat stress cracks in areas not associated with sharp corners would be considered more important structurally, particularly if there is a series of these. These will often take the form of either lengthwise running cracks in a hull or vertical cracks in a hull. Those that are noted as running lengthwise are usually due to some heavy stressing of the hull but not necessarily at that point of the hull and occasionally these can be found to enter the laminates. The usual cause is the hull flexing over internal assemblies such as a berth support or something similar.

These areas do usually require further investigation and gel coat removal due to the fact that they are often in areas either underwater or close to waterline. Long vertical cracks usually indicate the boat has flexed over the position of a bulkhead or hull stiffener.

This can be due to things such as heavy fendering when the boat has been squeezed in times of excessive whether on moorings with several vessels either side. In these particular cases it is always wise to ensure that vessel has fenders located at the strongest points, this would be directly over the positions of bulkheads not to one side which would allow the boat to flex over these bulkheads.

Again, these should be considered structurally important and worthy of further attention and/or repair. Unfortunately when undertaking surveys on vessels it can be extremely difficult and in some cases impossible to identify areas of longitudinal cracking if they are limited under the waterline, particularly if the vessel in question in has been recently painted.

The most difficult assessment for the surveyor to make is the importance of an identified hairline crack in the gel coat. In some cases it may simply be that, a hairline crack in the outer gel coat only however, there are many other cases where the cracked gel coat is in indicator that the laminate directly beneath it has also cracked and fractured, occasionally this fracture will be full thickness, often it is not. That is why any hairline crack that the noted in any underwater section will be rated as very important as there is a possibility it could be full thickness. It would be very unwise to ignore this situation if found. Hairline cracks above the waterline, depending where they are can also indicate major or minor faults however, there is less likelihood of the vessel taking water through these, the exception being, in some cases where cracks around stanchion bases are noted, it has been no that although the crack looks innocuous, it has allowed continual seepage right through the laminate because the hairline crack is full thickness in the very rare cases.

Hard spot damage

This is where an underlying bulkhead or stiffener within the hull that is contacting the skin of the hull causes a “hard spot”. When hammer testing the area, it is obvious that a “hard” item is directly behind the tested area. When the hull flexes, as nearly all do to a degree, the hull can hinge over this hard item and cause a crack in the gel coat and occasionally the laminate.

The usual cause of this is fender loads when the fender is located a short distance either side of the stiffener or bulkhead. If the loadings are severe such as can be caused by gales alongside in harbour with other vessels either side, the squeezing effect is considerable, flexing the hull and causing damage. Always ensure that fenders are located on bulkhead positions to minimise hull flexing.

This defect will also occur in some vessels due to the vessel twisting when in a seaway and heavily stressed. Some vessels will experience severe enough twisting to deform cabin door entrances and other closely fitting components, which, when the vessel is at rest, will be perfectly normal. This twisting loads specific areas such as hull bulkheads where the hull skin is under considerable distorting loads and will cause hard spot cracking eventually.

This type of cracking cannot be immediately identified as being due to hull flexing as it appears exactly the same as contact damage hard spot cracking as described above. When repairing this type of fault it is important be try to identify how the damage occurred. One off damage can be re-instated as per original strength, but an inherent hull weakness would have to have further strengthening incorporated, either with the installation of internal stringers or extra bracing.

Stressed areas

Other gel coat cracks can be indicative of weak structure and this will often be found in places of high localised loadings such as stanchion bases, rigging U bolt support areas, and other highly stressed areas. These are also very common areas on many vessels. Again, these should always be given priority as to assessment but, in some cases may only be due to the gel coat being unable to accept any flexing, in other areas they will be due to insufficient support on the underside of the laminate. Individual assessment is required. One significant area where this type of damage is often seen and is relevant is on fin and twin keel vessels is directly forward and directly aft of the keel position due to the obvious high loadings on the hull that these points, usually caused by the vessel grounding for instance and causing the vessel to slightly trip which has the effect of forcing the aft end of any keel upwards into the hull of vessel and straining the forward end away from the keel.

Power driven vessels

Many modern high-speed power driven vessels have a potential structural design failure particular to their own design. The majority of modern vessels have moulded in spray rails fitted on the underside. These serve two purposes, one is hydrodynamics for performance and the other is to add structural rigidity to the relatively flat sections of hull. In heavy weather and at high speed the vessel will undergo a degree of buffeting at the forward end and quite often the forward end of the vessel tries to flex and use the main or forward bulkhead as a hinge point. The upshot is that the boat does flex slightly at this point and these rails, which are unable to flex will, shows signs of fracture. These take the form of hairline cracks running across the rail from one side to the other and whenever the vessel is lifted from the water for general maintenance it is wise to check these areas in particular.

Cosmetic faults

Other gel coat faults, which visually appear to be important but structurally are insignificant are gel coat voids. This is where the original builders have applied gel coat to the mould prior to construction but, particularly in places of corners, have not been able to one reason or another to get the supporting laminates to lie directly in contact with the gel coat.
This creates a small area that could be likened to an empty egg shell where cosmetically the area looks perfect but over the course of years eventually the area does come into contact with, for instance, a shackle or shackle pin which is just heavy enough to break the thin shell of gel coat.

UV deterioration

Some gel coats can suffer from UV deterioration over the course of years. This will take the form of a myriad of surface cracks and crazes, which structurally are insignificant, but cosmetically very difficult to correct. It is thought that one of the reasons for this is the continual expansion and contraction of gel coat under the heat of the sun the causes eventual breakdown of the surface. It can often be found that there is a degree of gel coat deterioration around the exhaust outlets and occasionally, bilge pump outlets on some vessels. This is probably connected with the heated chemicals that issue from exhausts and possibly contaminates in the bilge water of some vessels.

It will often be seen that some gel coats retain a very high gloss, and others, no matter how much effort is made to achieve high glass, still remain slightly dull. This is usually due to slight differences in the hardness of the gel coat.

Hard gel coats will often polish to high gloss, but, unfortunately, hard gel coats are inclined to be brittle and will show flex cracking at much earlier time than the relatively soft gel coats which, although are generally more flexible, but refuse to take the high-gloss associated with hard gel coat.

Do all gel coat faults require repair?

This is a difficult question to answer accurately as nearly every boat over a certain age will have some non-repaired gel coat faults. The vast majority of boats will have several gel coat faults for the entirety of their life without any consequence structurally. In many cases the laminate behind the damage gel coat will be in sound condition and waterproof, that is, there will be no exposed fibreglass matting or cloth however, it can be occasionally found that where a tear exists in the first laminate for instance there will be some exposed cloth, this cloth can absorb water to a degree which can allow water into the structure.

In other places any cosmetic damage can be aggravated by the presence of water due to the fact that if enough water can lie between the damaged gel coat and the sound laminates, during the winter period these areas can occasionally freeze and force off further gel coat thus extending the area of damage although this is not particularly common. It is occasionally found that what appears to be only a minor gel coat fault or crack has been responsible for creating minor deck leaks due to the fact that a hairline crack was existent within the laminates in this area that could not be fully assessed or identified, this would be a case where it would be wise to identify and repair.

The most difficult assessment for the surveyor to make is the importance of an identified hairline crack in the gel coat. In some cases it may simply be that, a hairline crack in the outer gel coat only however, there are many other cases where the cracked gel coat is in indicator that the laminate directly beneath it has also cracked and fractured, occasionally this fracture will be full thickness, often it is not. That is why any hairline crack that the noted in any underwater section will be rated as very important as there is a possibility it could be full thickness. It would be very unwise to ignore this situation if found. Hairline cracks above the waterline, depending where they are can also indicate major or minor faults however, there is less likelihood of the vessel taking water through these, the exception being, in some cases where cracks around stanchion bases are noted, it has been no that although the crack looks innocuous, it has allowed continual seepage right through the laminate because the hairline crack is full thickness in the very rare cases.

Repairing
cosmetic faults

There are two methods for cosmetic appearance. The usual one is gel coat filler where a matching colour gel coat is used as a filler for the area of damage. In the case of a deep scratch for instance, the scratch will be cleaned and abraded to promote good adhesion and a small quantity of mixed gel coat filler or genuine gel coat will be used to fill the area just over flush so that the new area is proud of the surface. Real gel coat requires covering with cellophane or similar because the surface remains sticky if exposed to the air. When cured, the area is carefully sanded back with a backing block to flush it down. Fine wet & dry of about 600- 1000 is used, finishing with much finer paper still and finally using cutting polish to get the final gloss.

Larger areas with multi cracks will usually be too finicky to do it this way and the area will be prepared with epoxy or polyester (car body filler above waterline) fillers and the areas locally resprayed with matching two pot acrylic finish. Vehicle refinishers will often be able to help make precise matches with virtually any colour. If the finish is carefully chosen and applied, it can be impossible to discern the area subsequently. A hand painted finish will always be more difficult to disguise and will often be instantly obvious with a possible resultant loss in value.

improving the finish

To improve the finish on a “dull” gel coat then it is usual to machine polish the hull. By using an abrasive cutting compound on a sponge mop fitted to a dedicated machine polisher (similar to a large angle grinder but slower speed) a superior finish can be obtained with limited physical effort and minimal material costs. In the absence of a machine polisher, using wet or dry paper of no less than 1200 grade and using it wet can cut back very successfully, but the hull requires polishing back by hand to achieve the required finish. The safest thing in these circumstances is to do a small test area before buying/hiring/employing machines and materials.

The amount of gel coat removed in this is absolutely negligible and will not have any detrimental effect at all. Finally using a fine compound such as T Cut can give the hoped for gloss. This procedure can remove minor surface scratches and chalking and will make some deeper scars less visually noticeable, but some gel coats, particularly soft ones, will, despite all efforts, remain slightly dull, in which case a total repaint is the only way forward.

hull painting

If it is finally decided to repaint, without going into depth, the finish will be a direct result of the preparation and would be considered the most expensive and time consuming. All scratches, scars and gel coat cracks should be attended to. In most cases polyester body filler is suitable above the waterline, These should all be flatted down flush and should not be able to be felt whatsoever as they will show through. The hull should be totally abraded and free from any remaining polished/glossy areas. The grade of paper used will be dependent upon the method of sanding, power sanders can use coarser grades without leaving the same abrasive marks as hand sanding with the same grade. Generally on a good orbital sander, finishing dry with 240 or 320 grade is often acceptable provided the new paint coatings are thick enough. By hand, 400 –600 would be absolute minimum if used wet. Individual gel coats will differ so always be prepared to make changes to this based upon results.

The finish coating can be sprayed or hand painted. A good respray will add value; a bad hand paint will remove value. Both hand and spray coatings can be of oil based or two-pot acrylic based. The two pot acrylic type is better sprayed as it requires experience to successfully hand paint, but it can be done. The Acrylic finish is more durable and generally longer lasting than the underlying gel coat. Oil based finishes will eventually require re-coating.

more serious cosmetic/structural faults

The method of repairing gel coat cracks depends significantly upon the extent of the damage to the underlying laminate, which must take precedence over cosmetic effect under any circumstance. In the case of structural cracks to both the laminate and the gel coat in the region of bulkhead positions and other stiffeners within the hull, then the most important thing would be to identify the depth of the crack within the laminate.

This would involve removal of the gel coat in the area and removal of the underlying laminate in the area of the crack. It is quite common for the area of repair to significantly extend beyond the localised area of the crack due to the fact that any overlying laminates have to have a substantial area of sound laminates to securely attach them. The generally accepted practice is to grind the area of laminates away in the form of a shallow saucer or very shallow "V" with the width many times that of the depth, and gradually rebuild the area with new laminates of epoxy and glass cloth, each lamination overlapping the previous until almost flush with the surface.

Generally this will be finished with, if it was above waterline, polyester filler and matching paint finishes, if it was below the waterline epoxy filler and epoxy finishes. Just as importantly it is imperative to ensure the damage cannot be repeated, if the damage was caused by excessive physical damage such as contact with another vessel or something similar then probably reinstating the original strength will be adequate but however if it is due to an original design deficiency then it will be wise to take professional advice upon the addition of internal framing and stringers. Occasionally when a hull has cracked severely over a bulkhead it is wise to add stringers internally that pass through the bulkhead to prevent the hull hinging over this bulkhead. This will usually require a section of the bulkhead cut away to allow the stringer to be added to the hull internally in one continuous length past the bulkhead.

materials

Although the majority of vessels are constructed from polyester resins it is thought that subsequent repairs with polyester resin may not have as good adhesion to older cured polyester laminates, although provided a very good key is provided, a reasonable connection can be made. Polyester is not particularly suitable for permanently bonding timber. Where any doubt is present, then epoxy resin is a far more reliable and perhaps stronger repair if completed well. Powder bound glass mat or glass cloth should be used with epoxy resin as the emulsion in the emulsion bound mat will not dissolve in epoxy, causing wetting out problems.

Under deck reinforcement

Where the gel coat is cracked because of localised high strain such as stanchion bases etc then the underlying area should be reinforced with the addition of plywood pads where appropriate to reinstate the strength in the first place. The underlying laminates may need repair and in some cases, depending upon the severity of the crack and the importance of the load taken.

The method of cosmetic repair would entail grinding out of crack and adding extra laminates if these have become weakened to any degree. Finishing these areas invisibly can be relatively difficult occasionally.

It can often be found that for instance, in the cases of deck structures, there is a high degree of flexing, this flexing will eventually lead to cracks at the hard spot points and it is always wise in these cases to consider adding reinforcement below decks. The normal method of adding extra stiffness subsequent to build would be to bond in plywood stiffeners on the underside of the deck.

Deck distortion

It is not uncommon for areas of deck to show signs of distortion, particularly in areas where high loadings such as rigging attachment points can strain the deck upwards at these points. Some vessels will have plywood inserts beneath the U. bolts: others will have the rigging loads taken by the bulkhead. In the case where deck fitted U bolts are present it is important to monitor the condition of the plywood backing plates in this area, often these will be encapsulated under the deck and as such will be non inspectable, but nevertheless these areas can decay significantly in unseen areas. The usual signs will be localised distortion on the side deck at these points where the load spreading ability of the plywood has failed. Very occasionally, where there is visual distortion of the sheerline at the point of the deck attachments this can point to bonding failure of the deck/hull joint. Other areas of distortion which are very common are where the baby stay is fitted on some vessels due to insufficient backing pads under the area of deck, and occasionally close to the forestay stemhead fitting where either the fitting can shows signs of distortion or lifting, or, the underlying plywood is failing as earlier noted.

Repairing deck distortion

If there is any indication in the report that there is evidence of this type of distortion it is always wise to undertake some further inspection. This occasionally will require the removal of under deck linings and in the case of over laminated areas of plywood, these areas being exposed. Once exposed it is fairly easy to see if there is any underlying fault. In the case of decayed plywood it merely requires all of the plywood to be removed, new plywood of similar or perhaps larger sections installed and the area re sealed as required.

If there is any sign of deck/hull join failure then this area should be further reinforced with mechanical fastenings and over laminating to sound deck and hull structure to add critical reinforcements, these will generally be epoxy resins and glass cloth. Occasionally in the case of rigging reinforcement areas, it will be found that substantial design improvements might be required, this would entail creating fittings in perhaps stainless steel or galvanised steel that locate under the area of support such as the rigging "U" bolt and can be taken down to an adjacent bulkhead or the hull side for mechanical attachment. The majority of vessels merely rely upon the rigidity of the side deck, which, regarding rigging strains, over the course of many seasons, is not found supportive enough. The usual method is the manufacture of a bracket that can transfer the strain to the main bulkhead.

Occasionally it can be found that bonding a substantial pad on the inner side of the hull directly below the rigging position and connecting with an adjustable stay or rod with appropriate connections can add an enormous amount of rigidity to the area however, this is not always practical given the internal accommodation designs of some vessels. Each method must be employed on its merits. There is also no reason why external chainplates cannot be fitted in some cases, these are merely straps taken down the outside of the hull for a reasonable distance, usually stainless steel bolted to the hull with a minimum of three bolts per strap with a degree of internal extra support bonded to the hull such as substantial plywood pads to further spread the load.

This is the very traditional method used with timber vessels however, many owners of fibreglass vessels will be unwilling to have the cosmetic finish somewhat marred by the addition of external fittings such as this, although, if feasible this is perhaps one of the strongest methods that can easily be fitted and was often used in many of the early GRP designs without any of the more recent problems of distortion.

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.

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.

Cored decks (and hulls)

This type of deck (and in some late vessels, the hull also) has the benefit of being very rigid for a given weight, but after many years the inner core which may be balsa wood, polyurethane foam or simple panels of encapsulated plywood may lose adhesion with the inner or outer skin, which affects the rigidity considerably. This is noticed by unusual flexing and creaking whilst walking on deck and perhaps odd water drips on the underside caused by the core absorbing water from the deck via deck fittings etc. This is not always easily detected at the early stages.

This is why in survey the deck will usually be hammer tested, but again this can sometimes not detect this at an early stage. If ever detected, it may be possible to inject epoxy resin into a series of 3mm holes in the area of suspicion, and if the failure is limited to just bonding failure, this will reinstate the bond.

If a high presence of water has entered the core from leaks on deck, this can cause breakdown and failure of the core. Always ensure that deck fittings are maintained and any areas of strain or damage are attended to that may allow water into the core. In the case of serious breakdown of the inner core, whether it be balsa wood, polyurethane foam or plywood there is no option other than complete removal of this core.

It is generally not feasible to remove the inner laminate to gain access to the core so most cases the outer laminate is removed. In the case of a failed deck core for instance, a considerable section of outer skin of deck will be removed by using a cutting blade on an angle grinder or something similar and cutting around the physical limits of the moulding. This section is then completely removed and full access to the underlying core can be made. Once reparations to the core are complete depending upon the type of core present, the outer section of deck will be refitted and overlaid with epoxy resin and glass cloth along the boundary-connecting join. As you can see, this would be a very expensive operation if repairs were required to this extent. It is not generally possible to remove any type of severely deteriorated core by simple access holes in the moulding, either above or below. One would have to take professional advice in deciding whether an area is suitable for localised repair or wholesale removal as, there would be a considerable difference in labour and overall costs. It is obvious from reading this that a cored hull that was showing severe breakdown would be phenomenally expensive to professionally repair and, it is likely that some boat yards would not undertake this scale of repair.

Occasionally it is possible to drill drainage holes in one side of the laminate to allow saturated core to drain, but these holes have to be quite large because the only way of drying the core will be to use a heat gun on low setting to encourage gradual drying via these holes by heating the external laminate at various points. A moisture meter will monitor the progress of this slow method. However, the original source of the water ingress must be located and cured. This could be as simple as a leaking fitting or as difficult to locate as a hairline crack some distance from the point of saturation.
It is also required to ensure the bonding is reinstated. But beware of decayed balsa, plywood or polyurethane foam that has chemically broken down. These should be replaced as they are useless for strength now.

Gel coat voiding

Gel coat voiding, if identified before the voids has been broken can easily be repaired almost invisibly by the drilling of a very small inlet and exit hole in the area of avoid and injecting some catalysed epoxy resin. In areas where the voids has been broken open the only alternative is to fill these areas with either polyester filler or gel coat filler if they are relatively shallow if above waterline, epoxy filler below. Take care, when drilling, not to drill right through the skin of the hull.

Impact damage & finishing

In areas of localised impact damage such as spider cracking, where the underlying laminate has not been damaged, just merely over painting the areas will not obscure the hairline cracks as these will immediately show after a few weeks. The most successful method is to, in the area of a limited number of cracks, carefully enlarge the area of each crack and fill with either gel coat filler or epoxy filler although this would be impractical in the case of a larger area of gel coat cracking in which case the area is usually better off by having the gel coat ground away and the whole area carefully resurfaced with appropriate fillers. Once the gel coat filler has cured, then flat down the area with a wet & dry paper 1200 grade on a sanding block to get a level finish, finally polishing. It may be considered that small localised areas of this type of cracking are best left unless prepared to spend a long time finishing as it is quite often the case that in the course of trying to make good the surface damage the area of repaired damage can be even more noticeable. In this case it is wise to consider localised respraying of the area with a two pack acrylic finish, similar to that used on vehicles. It can be of benefit to use this type of paint because very precisely some vehicle refinishers can match it up and if good quality paint is used, it has a good lifetime above the waterline.

Osmosis

A brief description of osmosis

If you can imagine the hull as a thick, but very fine filter, allowing water to pass through exceptionally slowly, because of the fineness of the mesh, it is so slow that the water evaporates away on the inside of the hull instead of dripping through. This action is normal, but at some stage, the water that is in the laminate starts to break down and dissolve the stray chemicals left in the lay up, these new compounds are much denser than the water that helped create them, and because the mesh (the hull) is so fine, they cannot escape. The majority of grp vessels have myriads of small voids throughout the construction; it is thought that it is these voids that become the starting point for initial breakdown into new chemicals.

More water continues to combine with them and increase their volume & density but as their escape route is blocked, they form blisters to make enough room, this slow process continues until they are released by gel coat removal and flushing all reaction chemicals away. In extreme cases the laminate can be forced to delaminate as the pressure of the blister fluid increases, when formation of blister fluid is deep within the laminate.

The moisture meter indicates the presence of water and blister fluid, but does not differentiate between water and the blister fluid, the water dries out, but the blister fluid does not, therefore the reason for watching how the readings change. It is also not unknown for gel coat blisters to simply be caused by gel coat aeration bubbles when the original gel coat was vigorously mixed and applied, with the inclusion of air bubbles which subsequently show as small blisters as they become water filled. This type of blister is not usually of any consequence.

Before commencement of any remedial treatment, investigation into which type of blister is present is crucial to avoid unwarranted work. It is often found that fully treating a vessel too early can be counter productive, just as epoxy coating a vessel that has high moisture readings can accelerate the breakdown within the laminate and possibly cause a vessel to develop blistering that otherwise may not have developed blisters for many seasons.

The development of blisters cannot be guaranteed simply based on a hull that has high moisture readings, and many vessels will continue blister free for several seasons but with continually high readings. It is not a condition that can be accurately forecast. The development of osmosis action is directly linked with the time spent afloat, store a vessel dry for 6 months out of 12 and it might be expected to double the time before treatment becomes necessary. Other surveyors & repairers may have differing views and the above is in my opinion only.

Wicking is where exposed ends of individual strands of glass fibre act like straws and through capillary action, draw water into the laminate. The strands of glass swell and show the pattern of glass matting through the gel coat. Epoxy coatings can prevent these being seen. It is not thought that this is structurally weakening to any great degree and will be present for many years before any structural effect is noted.

This is a necessarily simplified explanation only .

Moisture Meter readings

The most commonly used meters are the Tramex Skipper & the Sovereign. There are many other meters in use and these are just as reliable usually but the readings are not always easily compared to the two above. The Tramex has 3 selectable ranges of differing sensitivity and measures RF conductivity between two large pads. The display (similar to an analogue multimeter) is calibrated 10 – 20 on top side of the scale and 0 – 100 on the lower side of the scale i.e 10 on top is the same as 0 on bottom. and 20 on top is the same as 100 on lower side.

Usually the most sensitive range (no.2) is used to indicate whether the hull is suitable for epoxy coating as epoxy coating is more successful the "drier" the vessel is. Usually epoxy coating will not be professionally suggested if the residual readings are above about 15 on top, 50 on lower using range 2. Range 1 starts where range 2 finishes, and range 3 starts approximately where range 1 finishes. Generally, a vessel that has residual readings less than 15 on top scale using range 2 is not likely to be suffering from any excessive degree of chemical activity in the hull. A waterlogged skeg or rudder will often be off the scale on ranges 2, 1 and sometimes range 3, which does indicate high moisture content.

The readings obtained on most vessels will usually be anywhere from the high end on range 2 through all range 1 and up to the bottom of range 3. which would be considered quite high. The Sovereign meter only has 2 ranges, and the analogue scale is calibrated with various numbers but one of these is 1-100, which will be used by myself when referring to this in any survey. The drawback with this meter is that the only portion of the 1-100 reading that is used will be 0 – approximately 20 using the most sensitive range "A" Approximately 12 on the sovereign using scale A is equal to 15 (50) on the Tramex range 2..

Interpreting the readings should not be undertaken lightly. Internal bulkheads and engine bearers for instance will be picked up as very localised high readings when there perhaps is no underlying high laminate reading. Water tanks can also indicate high readings as will the presence of water in the bilges and of course, metal parts including keels. Spurious high readings will not be unusual in any vessel.

When a vessel has been recently lifted from the water, these readings will generally always be higher that those obtained after seven days ashore, and it will be impossible to accurately forecast what these readings will eventually settle down to. Each vessel is different. For an accurate idea of what is happening to the laminate, a set of readings should be taken a short time after lifting, then another set, perhaps ten days later and note the changes.

Any changes after that time will be less noticeable. Any readings taken are basically reference numbers for comparison and do not represent any actual percentage of moisture content in the hull. Just occasionally, it can be found that a hull that has little or no "moisture" content will exhibit higher readings and when an area of topside is checked that is absolutely known to not be subject to any water absorption, this has a high starting reading which can be misleading regarding any areas below the waterline on the same hull as this start reading automatically gets added to the residual reading. Epoxy coatings can also help give misleading readings and it would be unwise to carry out any invasive repair work based upon moisture readings alone. High moisture readings without any other visual or physical evidence, should, in my opinion, not be used as a basis for any costly works on a hull.

Drying problems

Occasionally it has been found that in a minority of vessels, some from well known builders, when remedial work is undertaken for blistering, it proves impossible to reduce the moisture meter readings to a low enough figure to enable successful completion of works using normal established practices e.g. a minimum of six steam/pressure washes after gel coat removal and slurry blasting. This, sometimes, has found to be a result of partial separation of the layers caused by resin starvation when originally constructed. Presently this cannot be successfully detected from normal sounding, non-destructive tests or visual methods, and although rare, I cannot guarantee that if and when any treatment is considered, this fault is not present. This fault is not easily cured as it can be a major headache trying to locate the underlying cause.

The only indicator is usually very high readings at the low parts of the hull, but this is where bilge water usually lays and gives these readings anyway. In extreme cases hammer testing can locate this, but confirming this fault requires core samples to be taken and not surprisingly, few owners would allow this.

Some vessels have hollow sections such as a keel section, which is completely sealed in for instance; some power vessels have structural tank type mouldings as part of the hull support below the waterline. Eventually, these can partially fill with water and can go unreported for many years as it may not be possible to absolutely confirm with a moisture meter that water is present in them, for instance, when a vessel has been lifted immediately prior to survey and the hull remains physically wet. Even if the meter does suggest water is present, it should not be assumed as absolute as earlier noted, readings can be misleading for several reasons. There is only one sure way, and that would be to drain the area, either externally in the case of a hollow keel, or internally in the case of a structural tank type moulding. Generally drilling a drainage hole in a hull or mouilding should not present any structural problems subsequently provided care in placing the hole is taken. Obviously keep clear of internal bracing points, internal fluid tanks etc. The area can be made good by preparing externally by thorough abrasion and dishing with a grinder/sander. Plug with epoxy filler and overlay with glass cloth & epoxy resin. The problem remains then on where & how the water entered the area in the first place. epoxy coating problems

When a vessel has been epoxy coated at some previous time it is usually impossible to fully confirm the reason for the epoxy coating, or the standard of application of the epoxy coating. There are one or two obvious reasons for epoxy coating including as a preventative application, a finish for comprehensive repairs for osmosis, an unwise finish for a vessel that is already on the process of some osmotic action, but unwisely thought by the owner as a way of preventing further deterioration and lastly and perhaps most seriously as a way of disguising the vessel that would be otherwise seen as having obvious visual signs of blistering by merely surfacing the exposed blisters flat and immediately epoxy coating without re-launching the vessel. In this particular case the blisters would not reappear until the end of the following season, giving the false impression that blistering has suddenly occurred, but is the result of perhaps attempts to mislead the buyer and surveyor.

In some cases, these works will be undertaken "professionally" at the owner's expense by a boatyard, so it is always in the best interest of the interested party to make further enquiries regarding any epoxy coatings, as it is virtually impossible for a surveyor to absolutely describe and ascertain the laminate condition as regarding blistering in this case without wholesale removal of these "expensive "coatings.

It might be wise to have written confirmation from the owner in these cases for the reasons of epoxy application, which would then place a legal obligation on the seller in the case of deliberate misleading statements.

In most cases it can be impossible to identify the particular reason for epoxy coating because without removal of the epoxy coating, which is not usually acceptable by either party, it is not possible to access large quantities of the underlying original gel coat. It is strongly recommended that whenever any epoxy coating has been identified under a finish of antifoul coats, the interested party make further inquiries as to when and where this coating was applied. Epoxy coatings are not a guarantee that the vessel will never develop blistering. Even epoxy coatings can fail and, if not applied correctly or thickly enough in the first instance will fail earlier then occasionally anticipated. Other failure problems involve incorrect application such is applying in the wrong temperature, excess humidity at time of application, less then minimum hull preparation standard and obvious user problems such as incorrectly mixing. Another application fault that can be suffered by many non professionals is what is known as under cure where, the application temperature was suitable at the time but a sharp drop in temperature and an increase in humidity within a short time of the application halts the curing process of the epoxy which can never be fully restarted.

Any or all of these problems will substantially shorten the life of any epoxy coating. Moisture meter readings taken of some epoxy coated vessels will inevitably be high but it has to be ultimately that a degree of professional speculation as to what the cause of these relatively high readings would be. It is extremely rare to locate a vessel that has been epoxy coated and has negligible moisture meter readings despite this being the ultimate aim.

Epoxy coatings will also require renewal or reapplication at some stage, generally any time after 10 to 13 years might be an expected time for an epoxy coating deterioration (the epoxy coating starts to allow higher water ingress) Epoxy coatings themselves can also blister, this is not detrimental to the hull of the vessel but is caused by water entrapment between the epoxy coating and the hull.

In this particular case it has to be seen as a failure of the epoxy coating but not necessarily a failure of the hull structure. Unfortunately this can lead to high moisture readings merely due to the epoxy coating failure and not necessarily to a residual reading within the hull. Perhaps now, it can be understood how difficult and ambiguous moisture meter readings can be.

Epoxy coating suitability?

This is an area where many yards and surveyors perhaps differ, it is generally accepted that in epoxy coating a vessel which has moisture readings beyond a certain point is an unwise procedure and ultimately a waste of time effort and money and, in some cases, can accelerate the course of any osmotic action within the hull if it is already present.

It is strongly suggested that whenever undertaking epoxy coatings in a non professional circumstance, it will be wise to gain some professional record of the readings obtained prior to epoxy coating for future reference and perhaps saleability as, as can be seen above there are some dubious reasons for epoxy coatings and it will be wise to have a record of precisely the reasons the epoxy coatings have been done and of the application details which will give any future purchaser a degree of confidence.

If the readings are considered by the surveyor at that time to be too high for epoxy coatings then, provided there is no serious blistering to the extent of weakening the structure and no evidence of delamination or other structural fault then, in my opinion, it is always best to leave well alone however, there are others who have differing opinions upon this but it has been found by experience in the past that carrying out any remedial work at the wrong time is often the cause of early failure of that new work, and in some cases the vessel would have fared better without any works carried out whatsoever as the development of blistering and associated faults can be extremely difficult to forecast with accuracy and some vessels that have a limited blistering at present may well go on for many seasons without any noticeable alterations to the hull.

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 rudder stock 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.

Fastenings and other metal fittings underwater.

With the exception of purpose designed skin fittings for fittings such as speedo logs and echo sounder etc.and. at present rarely used composite plastic type fittings specifically designed for underwater use, all other skin fittings will generally be metal., usually a form of bronze such as gunmetal or similar, occasionally stainless steel. The reason for this is that all underwater skin fittings require seacocks to be fitted and seacocks cannot be safely fitted to any nylon skin fitting. Nylon skin fittings are also prone to fracturing with age. Any fastening or fitting below the waterline can be prone to corrosion. Whether it is bronze, stainless steel, mild steel etc and from time the time all of these fastenings and fittings will require inspection.

Some will inevitably last several seasons, perhaps decades longer than others however, it is not easy to accurately forecast the longevity of any fastening therefore some of these fastenings will require inspection from time to time. Stainless steel fittings/shafts and fastenings can suffer from crevice corrosion on the unseen parts of these which, in some circumstances can cause them to structurally fail with severe consequences, the only way of checking these is to remove the item for direct checking.

Bronze fastenings can suffer from corrosion; they become brittle and can crumble when placed under load. The usual sign of bronze failure due to corrosion is a dull red coppery finish on the surface of the fastening compared to the original gold/brass colour when new. This will also apply to the skin fittings themselves.

Any through fastening will also be prone to corrosion given the right circumstance; this includes keel bolts, fastenings for skegs and rudders and any other place where an attachment is held to the hull body with a fastening below waterline. In the case of ferrous fastenings a degree of corrosion staining can be noted after the vessel has been ashore for a short while. It is wise to be aware of all fastenings and metal fittings that are prone to corrosion, particularly those below the waterline and carry out checks to those on an occasional basis. Usually, a great deal information on a particular class can be found in the experiences of others if there is an active class association.

keelbolts

Any vessel with an external suspended ballast keel, whether it be twin bilge keels or fin/central keel will have a mechanical means of retaining the keel to the vessel. These keels are usually either cast iron or lead, more commonly cast iron. On GRP vessels the keel bolts or studs on lead keels are commonly stainless steel (although similar lead keels on timber vessels will be bronze) and on cast iron keels these keel studs/bolts will either be mild steel of significant size or stainless steel. There are several different methods of fitting these keels depending on the original builder. The majority of builders use studs screwed into the keel and on the internal side of the hull a substantial nut and backing washer/plate is wound down on to the base of the hull. Some builders tap a thread in the iron keel into which bolts can be screwed from inside the vessel. The advantage of this method is that generally these bolts can be removed for inspection without any major interference provided access is available internally. On lead keels, due to the nature of lead not having the tensile strength to hold a thread it will often be the case that these bolts are fitted as what is known as galleried. A short distance below the top of the keel perhaps about 6 in., it cavity is cut in the side of the keel which will line up with a hole drilled vertically from the top of the keel. Within this cavity is placed a nut and washer and a studs/bolt can be inserted from the top to pick up this nut. In very rare cases, a complete through bolt will be fitted although, generally not in the case of a keel with substantial depth. Depending on the original builder, internally these nuts or boltheads will be left exposed or in some cases over laminated. In the case of exposed nuts and washers that have not been recently overcoated with paint any obvious leakage or corrosion staining will be seen immediately. In the case of over laminated nuts and bolts these areas are not so easily seen. However, keel bolts on GRP vessels, if carefully fitted and carefully sealed from new do have a record of relatively long life and, in my experience, are not subject to the same degree of deterioration as occurs on timber vessels. Occasionally it can be seen that if the bilges on a fibreglass vessel have a sustained level of bilge water above the base of the bilge where the keel bolts are fitted and these keel bolts are not encapsulated and are of mild steel then a high degree of corrosion eventually affects the internal heads and nuts and, if anything, these bolts need replacing due to this sustained damage. It is practically impossible to remove the keel studs without total removal of the keel however, it may be possible in exceptional cases to be able to lock two nuts together on the same stud and attempt to unscrew the stud from the keel, if there is enough length of exposed stud available for this, this can occasionally be successful.

The main usual problem with ballast keels/GRP boats is a degree of flexing of the keel and failing of the sealant which then allows water to affect the hidden shank of the stud/bolt and occasionally leak internally. This will be evidenced by movement along the mating edge of the keel/hull join however, the majority of vessels will have a degree of movement in this area and it comes down to a degree of judgement as to the extent of this movement. It is impossible to assess any flexing when the vessel is standing on its own keel/s. Occasionally when the vessel is in slings this hull/keel joint can be seen to open and in some circumstances some keels can be seen to move if strained. In these cases it may be appropriate to attempt to tighten the keel bolts/nuts. In other cases it may be necessary to inspect these studs or bolts and replace the sealant between the keel/hull it there has been significant disturbance and leakage cannot be cured by merely tightening the keel bolts.

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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. 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.

Looking after sails:

Most modern sails are very durable but nevertheless can suffer from damage and stretching. They can & do suffer from U/V deterioration, becoming excessively weakened by long exposure to sunlight. An affected sail visually looks no different to a non affected sail, but if an attempt is made to tear the sail by hand, a good sail will resist tearing but an affected sail will tear as easily as paper at is worst. This damage is irrecoverable. The survey cannot examine every square inch of the sail for reasons of practicality and space. Foresails that remain on furling gear for extended periods must have sacrificial strips fitted to protect the expose sail. Likewise in mast furling mainsails. This material is either sailcloth or for longer lasting, acrylic canvas.

Ensure the main is removed from the boom or fitted with a boom cover when not in use to avoid UV damage.

Stretching occurs with age and using the sail in excessively strong winds that the sail was not designed for, sometimes furling genoas are built too lightly for high winds despite being reefed and will distort. Also leaving the foot of a mainsail constantly tensioned will stretch it eventually. Only a professional sailmaker can make an accurate assessment of wear/stretch on a sail and it is strongly advised to use their experience in this regard if in any doubt. New sails can be extremely costly, (a mainsail for 36ft vessel possibly being as much as £1500) however, provided the sail is structurally sound, it is generally only performance that is affected and these could be replaced at a later stage.

Tan sails will fade with sunlight. Stitching will suffer from abrasion and should be attended to when seen Avoid using grease on the sail track/s as this will spoil the sail.

Most sails can be washed, in my experience they are more resilient than professional sailmakers will lead you to believe with regard to washing solutions and domestic washing powder is quite successful provided the sail is well rinsed after washing by laying on clean dry lawn and hosing down.. Soaking in a bath is possibly the best way to handle a large sail, however, it might be wise to carry out trial testing to a small area first.

OTHER AREAS THAT COMMONLY GIVE CAUSE FOR CONCERN ON VESSELS

Seacocks

Virtually every vessel will have at least one seacock fitted. These are absolutely required on all underwater skin openings other than speedo and echosounder transducers. The inspection should have tested each and every one of these where accessible to ensure they are in working condition. There are three basic types of metal valve, lever valves which have a tapered cone which is turned to line up inlet holes with the body of the valve.
These can be adjusted by tightening the plate that adjusts the cone depth into the body. Usually bronze, often fastened with through bolts that pass through the hull, these bolts can fail due to corrosion eventually and have to be checked on occasion. Perhaps every six – eight years, they are very reliable but expensive. They can suffer from corrosion. They should be serviced every season by removing the plate and cone, cleaning and polishing the mating surface of the cone/body and lapping in if required and reassembling with underwater grease.

Gate valves, which are inexpensive, available in many sizes but relatively prone to failure with age and corrosion. The pressed steel turn handle can rust severely and fail, the quality of the valves is very variable with many using inferior brass internal mechanisms, which eventually fail. The normal tests for this type of valve is to undo the valve to its maximum using a reasonable force but obviously not excessive and then go to the other extreme, tighten the valve up to a reasonable degree.
It will be noted that on a failing valve the degree of take-up or free movement noted on the handle before the valve starts to open or close depending upon which end of the thread is being used will gradually become more and more as the valve gets older eventually completely failing when the free movement reaches approximately a half turn.

This leaves the valve in either a permanently open or permanently closed position. If compared with a new valve it will be noted that the new valve has very limited free movement, perhaps about ten degrees.

Ball valves have gained quite a lot of popularity and are also a relatively inexpensive, available in many different sizes and, unfortunately are available in various qualities. These simply use a ball with a through hole drilled in it which is held captive in a nylon shell within the body the valve and a simple handle is attached externally to a align the hole with the body of the valve or close the hole off. Again, these are fitted with a pressed steel handle which often rusts severely.

Both a gate valve and ball valve are fitted to a skin fitting; this is usually a threaded tube of bronze with an external flange and any internal nut which tightens the fitting to the hull. being bronze, this is also subject to occasional deterioration due to metal fatigue and dezincification. Unfortunately the most susceptible area for deterioration of these is the part that passes through the hull skin It is not possible in the majority of inspections to be precise on the condition of these hidden parts and these should also occasionally be removed from the vessel for inspection. Quite often, it is found difficult to unscrew valves from the skin fitting without disturbing the skin fitting.
All underwater kin fittings should be metal; PVC or nylon should not generally be used unless it has been specifically passed for this purpose, which is unlikely.
The other main fault noted with seacocks is usually to do with the connecting pipework, method of retaining the pipework to the seacock, condition of the pipework and in some cases, surprisingly, the access to the seacock. Occasionally it is found that some builders install seacocks and then install the joinery surrounding them and in these cases can prove practically impossible to access the seacock for normal maintenance or replacement without damaging the associated joinery. All underwater seacocks should be fitted with pipework that it is of a suitable standard. This would not usually be anything less than reinforced PVC that has been particularly constructed for this purpose.

Car heater hosepipe rubber tubing is not acceptable. In all cases pipework should have retaining clips fitted, and these should be in good condition and preferably of stainless steel, however, plated jubilee clips although they will be much less longer lasting, are still acceptable provided they are in very good condition.
Where possible all pipework should be double clipped, but there are one or two exceptional cases that due to the reduced length of the stub on the seacock, the fitting of an additional clip has the effect of trying to pull the pipe off instead of clapping it securely on, always use the safest method.
When replacing skin fittings and/or seacock fastenings, wind a grommet of cotton caulking around the external flange of skin fitting or head of bolt to seal.

Anchor & Ground tackle

The following table should be used as a guide to approximate weight and size of anchor. Any vessel that is used for extended cruising or any vessel over approximately 26 ft. should have the option of a secondary anchor with a dedicated anchor chain/warp. All anchor shackles should be securely moused and the bitter end of any chain should be securely attached to the vessel by a strong lanyard that is long enough to exit the hawse pipe to enable it to be cut in an emergency. The loss of the chain is preferable to the loss of the vessel if needs require.

Max. Boat Length	Boat Displacement	Min. Anchor Weight		Dia Shackle	Dia Chain	Nylon Rope Dia
Dinghy, Tender, Optimist	n/a	2 kg	4.4 lb	8 mm	6 mm	6mm
Dinghy, Inflatable Boat, Small Catamaran **upto** 4m	300kg	3.5 kg	7.7 lb	8 mm	6 mm	6-8 mm
Boat **upto** 5.50 m	800 kg	6 kg	13 lb	8 mm	6 mm	10 mm
6.50 m	1000 kg	8 kg	17 lb	8 mm	6-7 mm	10 mm
7.50 m	2000 kg	10 kg	22 lb	10 mm	8 mm	14 mm
9 m	3000 kg	12 kg	26 lb	10 mm	8 mm	14 mm
10.50 m	4500 kg	14 kg	31 lb	10 mm	8 mm	14 mm
12.50 m	8000 kg	16 kg	35 lb	12 mm	10 mm	18 mm
16 m	12000 kg	20 kg	44 lb	12 mm	10 mm	18 mm
18 m	16000 kg	24 kg	50 lb	16 mm	12 mm	22 mm
20 m	20000 kg	34 kg	75 lb	16 mm	14	24 mm

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					mm	
25 m	30000 kg	40 kg	88 lb	16 mm	14 mm	24 mm
25 m +	30000 kg +	60 kg	140 lb	18 mm	16 mm	28 mm

The anchor weight is only given as an indication, per length of boat. However, this criterion alone is not sufficient, and your anchor selection should also recognise the specific construction of your vessel.

Gas Systems

Gas systems are often found as a cause for concern on any boat and built prior to 1988. The usual reason is that either vessels have been previously surveyed and the gas systems have been picked up but the owner has never got round to altering the system or that there has been some deterioration in the system since original build. The general requirements are that no gas storage should be below decks whatsoever and any storage container for gas cylinder/should be able to safely drain any escaping gas directly overboard without fear of any escaping into the accommodation. All connecting pipework should be so far as possible continuous lengths of copper tubing, which is well secured to the structure, connecting up to BS standard flexible gas piping. On the side of any approved flexible gas tubing are two dates, the year of the British standard, and the month and year of manufacture. If these dates are not evident, then it is likely that tubing is not of approved standard. Regulators should be replaced approximately every ten years. It is often the case that these regulators, because they are in relatively exposed atmospheric conditions and subject to continual seawater contact because they are in cockpit lockers etc will often require replacement much earlier. Any regulator that is in cosmetically very poor condition should also be seen as structurally unreliable. Wherever possible it is advisable to fit a gas tap close to the cooker or gas appliance, but always ensure this gas tap is rigidly secured to the structure of the vessel.

Calor Gas presently advise replacing the flexible tubing every five years. Any gas appliances newly fitted to any vessel of any age have to comply with the safety standards and specifications currently in force.

This also means that it is generally not acceptable to fit an old gas appliance as a new fitting unless it meets with current specifications, this is particularly the case in gas cookers which should be fitted with flame failure devices. (Originally fitted devices in the vessel are still accepted)

For further information regarding gas systems it is advised to study the Boat Safety Scheme pamphlet (available from 01923 201408) along with the Calor Gas guide which is available from Calor Gas on 0800 626626, which gives full information and advice concerning regulations covering gas installations aboard yachts.

Fire Fighting

The other common area where vessels are inadequately suited is in the area of fire fighting. A degree of common sense is required here as a vessel that has accommodation spread out with, for instance, a centre cockpit, will probably require more extinguishers than one which has an open plan accommodation all in the same area.

A sensible rule of thumb would be to install one extinguisher in each separate part of the accommodation and, as the vessel becomes larger, a minimum of two extinguishers would normally be carried in the main saloon, one forward one aft, particularly around the cooking area. Another should be accessible from the cockpit for use into the main saloon, the same one being accessible from the main saloon to use directly in the cockpit. In practice, depending upon the size of vessel this is somewhere between 1 and 4 in total.

On any substantial petrol engine inboard installation the best advice would be to install an automatic unit of appropriate power in the engine bay, perhaps two in some cases. In the case of a large cockpit, such as a substantial power driven vessel, a separate extinguisher should be permanently stored in an accessible position.

All the extinguishers should be permanently stored and easily accessible and highly visible. All modern extinguishers will have a date stamp written on them and the date of replacement due. Those fitted with pressure gauges should have the needle registering in the acceptable sector, and those that are subject to regular servicing intervals should have historical records attached.

The generally accepted minimum fire rating is 5A/34B, this should be stamped on the side of all extinguishers and is an indication of what size of fire this particular extinguisher is capable of tackling.

The A, B, C rating that is stamped on the side of extinguishers indicates the type of fire that this extinguisher .can tackle, A referring to paper, wood & textile fires, **B** flammable liquids petrol etc, **C** flammable gasses, propane, butane etc. Any vessel that uses flammable liquids or gas for cooking is required to have a fire blanket permanently located in this cooking area

The above information is given in good faith and without bias based upon experience. Where the report makes reference to this section, it is imperative that the relevant sections are fully understood and applied to the vessel if appropriate as some of the relevant comments above will form part of the report.

Some other professionals may have differing views and methods. If in doubt, please make other enquiries with regard to methods before embarking upon a complex repair. Always seek professional advice if unexpected problems occur in the course of any repair work or any uncertainty is present because of lack of experience in particular areas. It is assumed that all repair work carried out based upon this report will be to a professional standard at all times. No responsibility can or will be accepted by inferior workmanship or materials.

Please retain the above information as part of the survey report as it forms part of the report in many cases where any reference has been made to it.

In any cases where a degree of misunderstanding or ambiguity about any conclusion, comment or speculation remains, it is imperative the client contact the surveyor for total clarification of any points. No responsibility will be accepted for actions taken where the client does not have full understanding of the implications of any action taken upon reading the report.

The information in this section should NOT be used without reference to professional techniques and knowledge and is necessarily limited in its scope and is not meant as a professional guide to interpretation and repair of any of the faults described. No responsibility will be accepted for unnecessary or failed repairs undertaken on the basis of the information in this section.

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Surveyor Date