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J/80 Review & Best Practices – Part II

Since publishing J/80 Best Practices Part I, many J/80s have undergone the seven-step inspection recommended annually for the keel/keel floor area (see Appendix A). If you have not conducted this inspection, we strongly urge you to do so before the coming season. Part II documents the damage found on a 1994 J/80 as a result of this inspection as well as the subsequent repair.

Inspection & Repair of a 1994 J/80

The subject boat is a 1994 J/80 that was purchased by its current owner in the fall of 2008 after 14 seasons of sailing with at least two previous owners. The boat was run through the seven-step inspection process at International Marine, in Bristol, RI. IM has extensive experience with all aspects of composite construction including all of the J/ models.

1. The boat was hoisted in a travel lift a few inches above the trailer and the **tip deflection test** conducted (Step #1) There was approx 3/8" of tip movement off centerline to either side (which was slightly exaggerated by the boat moving a little in the slings). However movement continued after the tip was released indicating the likelihood of damage.

2. The same deflection test was then conducted with an observer below deck who confirmed that the fiberglass tabbing securing the three primary keel floors to the keel sump was loose from the side wall, meaning the molded sump was moving independent of the floors. A flashlight inspection of the same bilge area below decks (Step #5) revealed jagged lines along several tabbing edges – a clear sign of damage/debonding of the keel floor tabbing. The jagged tabbing did not reach up to the turn of the bilge and so there was no visible movement at the actual sump to hull intersection.

3. With various shades of paint on the bottom, there were no readily apparent cracks visible, but closer inspection of the leading edge of the keel at the hull (Step #2) revealed some small vertical cracks which appeared to be water saturated (older). The bottom front of the keel bulb was then sanded/ground back to show about ¾" of fairing putty, presumed to be from a prior repair, since the factory-issued keel is one with minimal fairing compound on the lead bulb.

4. The fiberglass sump was then tapped/sounded out to listen for delamination or voids (Step #7). Three areas were identified as possible issues. A moisture meter confirmed that all three areas had "elevated" moisture readings. Once the bottom paint and fairing material were sanded back on the worst spot, it revealed a circular area of damaged glass (lots of white crazing) – consistent with the assumption that, without tabbing support, the sump has been working both against and independent of the keel floors for quite some time.

Another suspect spot was covered in splotched red paint (same color as the paint on the bottom/front of the keel). This area was sanded back to reveal different fairing compound than neighboring areas, and beneath that more glass crazing and some delamination of the belly band (the cosmetic glass wrap that hides the seam between the lead and the sump bottom). The belly band is nonstructural but it appeared that water had penetrated the seam at some point and likely froze over a few cold New England winters. It was later confirmed that the yard that did the original keel fairing work in the 90s had ground off the original standard belly band as well as all the gelcoat on the sump.

5. The keel bolt torque settings were checked (Step #6) and deemed OK and there were no issues noted with crevice corrosion.

Conclusion of Inspection

Much can be hidden under bottom paint, but the tip deflection test produced an immediate red flag that further investigation was needed. The additional inspection steps (all of which are normal survey methods) re-confirmed and precisely located the damage; and in fact themselves would have revealed an issue even without a deflection test. The conclusion was that the tabbing between keel floors and the hull had become compromised most likely at least 2+ seasons prior to the inspection, allowing the sump to work independently of the floors, which over an extended period of repeated cycling, weakened the area.

Repair Specification & Recommendations
Marine engineering consultant John Fox (FCS Design/Team Foxy) was then retained to specify the repair to be carried out by International Marine in Bristol, RI. Because there was damage to both the interior and exterior of the sump, the interior was first repaired in order to fully stabilize the area. All paint was removed in the bilge area, and then all keel floor tabbing ground away; several layers of biaxial glass were laid in to reattached the keel floors. The exterior was then repaired - the crazing areas were ground back and repaired with biaxial glass followed by surface fairing material and paint. A subsequent tip deflection test resulted in near zero deflection (not measurable), and International Marine issued a 5 year structural warranty on the repair, which cost a total of $2,800. Had the damaged tabbing been discovered earlier in the boat's life, then exterior damage would likely have been minimized or avoided and the repair costs would have been considerably lower.

John Fox has subsequently designed two standard repair procedures, one for damaged tabbing, and one for sump related damage. Both will fall under a new "Repairs/Modifications" class rule submission currently drafted for 2010 (similar to the provision in the J/24 class rules dealing with the repair, restoration, maintenance of older boats within class rules/building specifications). While repairs need to be customized to the specific damage, the inclusion of a standard procedure/guideline will best ensure consistency in the field.

Action Items for J/80 Owners
Carefully inspect all of the key structural elements of your boat (see the complete Best Practices at www.j80.org) on at least an annual basis and always before undertaking any offshore passage. If inspection reveals potential damage, then consult with a surveyor or local yard for further investigation and a repair plan. Before undertaking any major structural repairs that may impact the weight distribution or shape of the hull or foils, be sure that the repair facility contacts a class measurer or J Boats (info@jboats.com) so that the repair is done within class/builder guidelines and remains within one-design compliance.

J/80 owners and service yards can register at www.jowners.org to access technical bulletins, owner manuals and general J/80 information.

APPENDIX A (Excerpt from J/80 Best Practices Part I)

HOW TO INSPECT YOUR KEEL/KEEL FLOORS (For Owners and Surveyors)

1. With your boat suspended from travel lift straps (OK) or braced in a cradle (best) or trailer (good), grab the keel at the bottom and forcefully rock it back and forth. This **tip deflection test** on a deep keel boat should create a small amount of flex over the keelspan and sump (if solid fiberglass like the J/80), but there should otherwise be minimal movement from side to side. When you release the keel it should immediately return to position (and not continue to cycle). It is also important to have someone belowdecks to check for movement in the keel floor or bilge area, or any evidence that the sump is moving independently of the keel floors.

2. Are there any visible signs of cracking on the hull at the front and back of keel? Check the full length of the leading edge and bottom of keel for any impact marks/dents, scrapes. The two go

hand-in-hand with grounding or impact damage. It's most common for grounding damage to first show at the trailing edge up at the hull, then leading edge at the hull, followed by the side along the sump to hull radius. Note that bottom paint can easily disguise visual clues like cracking, so when in doubt sand back the bottom paint in the area in question.

3. Is there any cracking at the sump/keel joint (approx 12" down from the hull)? A crack in the cosmetic wrap could indicate that the keel nuts have loosened and need to be re-torqued, or it could be a result of excess keel fairing in the area. A crack may permit water to penetrate to the keel bolts and cause crevice corrosion over time – particularly if in salt water. Keel nuts should be torqued according to ISO standards, which specify the setting based on bolt material and thickness. For example, a ¾" 316 stainless keel bolt has a torque setting of 125 ft lbs assuming clean threads.

4. Is there any cracking, no matter how small, along the radius of the hull to molded sump interface? This is the transition from the hull fairbody to the keel sump. If yes, then bottom paint/gel coat should be sanded back to identify depth of cracking. One should also inspect the corresponding area on the turn of the sump inside the boat and consider sanding back interior gelcoat to see if any damage to the glass (white crazing). The tip deflection test (#1) can help better identify whether the cracks are a result of flex or a different issue.

5. Remove all floorboards (both fixed and unfixed) and the ladder and thoroughly clean and dry all bilge components. With flashlight and mirror check all keel floor to hull intersections, including all edges of tabbing for any cracking or debonding. The integrity of the molded keel sump relies primarily on the keel floors and their secure attachment. If the keel and sump have excess movement, it is likely that the tabbing of one or more keel floors is compromised in some way (i.e. the floor is floating free from the hull). If there is any sign of different color gelcoats or paint, it is likely the keel sump has been previously repaired. When in doubt, sand away any gelcoat, clean area with a solvent, and look for white crazing in the laminate-- this may be a sign of delamination. Have a surveyor immediately inspect this area for structural integrity.

6. Carefully inspect the keel bolt nuts for signs of corrosion. Periodically have your yard back off the keel nuts (one at a time) and inspect for crevice corrosion on the keel bolts. This can also be checked with a magnet. 316 stainless steel is not magnetic but crevice corrosion changes the properties and the steel could become magnetic.

7. A surveyor will use other tools to check the area: 1) the "tap test"- tapping with a phenolic hammer or small rod to sound out both the exterior and interior for voids or delamination as well as to check the integrity of the glass tabbing along the keel floors; 2) a moisture meter for finding areas of elevated moisture; 3) even thermal infrared imaging to check for any inner laminate damage that might not otherwise be visible to the naked eye (see www.inspectboat.com for sample thermography images).