Percussion Tapping/Testing

Tapping, or percussion testing, is an extremely helpful non-destructive inspection technique. It can provide information of a vessels structural integrity which may not be visually noticeable. Percussion tapping usually causes no damage, except for perhaps a small localized loss of bottom paint.

Percussion tapping's primary use on a boat's is for determining the condition of fiberglass laminates. It is also useful when assessing the condition of wood and other construction materials. In fiberglass or composite boats, tapping allows detection of delamination. Fiberglass boats and their component parts are made of several layers of lamination. Gelcoat, coring and fiberglass material with resins are among the most common types of laminates. A separation or de-bond can occur at any level. Percussion testing allows detection of separation between the gelcoat and the first fiberglass laminate (skin coat). It can also detect delamination within any of the layers of the fiberglass, including delamination caused by osmosis (blisters) and debonding of layers adjacent to the core.

Photo of delamination between the outer skin and the core on a Bertram 63' Cruiser

Most boats are manufactured with a cored deck. Hulls, stringers and other parts may also be cored. Coring is usually balsa, foam or plywood, sandwiched between layers of fiberglass. The fiberglass layers on either side of the deck coring can delaminate, therefore percussion tapping both the top and bottom of the deck, where accessible, is a useful inspection technique. Fiberglass bulkheads are usually tabbed to the hull sides. Tapping the fiberglass tabbing can determine if the tabbing is properly attached. Poor bonding between the plywood and fiberglass tabbing can grossly weaken hull structures. Properly bonded tabbing can also become detached due to an external force from impact, heavy weather operation or even over tensioning a sailboat's rigging. Whatever the cause of de-bonded tabbing, the vessels hull integrity may be at risk, therefore it is important for the marine surveyor to assess the areas around the transverse bulkheads of a vessel.

In vessels that use organic coring material such as balsa or plywood the wooden coring can deteriorate due to wet or dry rot. Deteriorated coring due to these processes can often be detected by tapping. A properly made deck cored with balsa sounds solid and sharp when tapped, if the balsa is deteriorated the same deck sounds soft or dull and may also be recognized as a soft spot underfoot. Deteriorated coring can also be detected by tapping stringers and transoms.

Tapping wood boats and their wooden components also allow detection of deterioration or rot.

Many of the things detected by tapping are minimal including "voids" which may be found in composite structures. Voids are air bubbles trapped just below the gelcoat or skin coat. Tapping a void is distinguishable by the higher pitch. The area around the void will have a lower report than the thin-skinned void. The voids are cosmetic and a nuisance occasionally but are rarely ever significant structurally.

The tapping can be done with virtually anything. Depending on the material and thickness of the component which is being tapped variances can be found using the edge of a coin, the butt of a screw-driver or of course the preferred tool, a hammer. Some of the hammers I use to percussion tap are illustrated below.

Hammers can be made of bronze, steel, plastic or any hard material. As long as an audible report is made when the device taps the component being inspected. The difference in the sound made is what the surveyor is listening for. I have found metallic hammers give the most discernible reports, but I primarily use plastic hammers above the waterline.

While percussion testing is an excellent use of a non-destructive inspection technique it is but one of many inspection techniques, which are used in the process determining the condition of a vessel. Along with percussion testing many other methods are used in assessing the condition of a laminate. Flexing under foot, visual discoloration or cracks, indentations, crackling sounds when stepped on, concave or convex areas, discoloration are other signs of potential problems. Moisture meters can be used to help assess the condition of laminates and, when necessary, destructive techniques such as coring can be used.

References

- *David Pascoe: Bad News for Bertram, January 3rd, 2009*
- *Christian & Co: Why we tap your hull, July 22nd, 2013*