

June 10, 2003

NEVER ASSUME

Leon Levasseur

leon387@comcast.net

Victor Model Products, the exclusive manufacturer of the Soling One Meter includes a very comprehensive manual for its construction. Page 3 recommends the proper adhesives to use for construction. Detailed information is provided throughout the manual regarding what adhesive to use on specific parts. Page 7 details the construction of the keel and the use of a polyester resin for potting the lead shot. Notice the caveat about the resin not being compatible with the plastic used in the kit. It is only used as a potting medium not an adhesive. Unfortunately, I suspect many of us concluded that since epoxy was used in the keel it would be suitable elsewhere in the boat construction. This is a very erroneous assumption. Victor should revise the gluing data to state the fact that epoxy should never be used with the plastic (styrene). Styrene is oil, therefore use your imagination.

The class secretary for the Soling One Meter, Rich Dannenhoffer submitted a report for issue #130, which was very informative and in a direction, which I feel, is a positive one. Since that issue is an archive, I must call attention to what may be a very serious and erroneous suggestion about using epoxy as an adhesive. I would encourage others to conduct tests to confirm or reject my findings. The issue involves styrene plastic and epoxy. Sanding can help mechanical bonding, however it will not make epoxy suitable for styrene.

Styrene to styrene – Testors (Cement for plastic models) produces an absolute and perfect bond. This stuff has weird qualities. It is a gel to slow down evaporation however once two surfaces have touched it appears that both surfaces will soften and recombine should they be separated for a while. Be very careful not to use too much Testors for a joint. This glue will soften and penetrate through the thickness of the styrene. It will bond within a short period of time and the joint will remain “soft” for days. Excessive glue will cause the styrene to take a month or more to fully cure and in the process shrinking and or blistering the surface will occur, ruining an otherwise beautiful paint job. MEK is similar to Testors without the gel, therefore it evaporates rapidly and the surfaces must touch each other quickly before it dries and remain so until the bond is established. Apply with a suitable eyedropper or small brush to wick into the joint. You will always identify your boat because you will leave behind many fingerprints molded in the surfaces. Highly flammable.

Styrene to styrene – CA thick and thin. Sanding recommended as it enhances the mechanical bond. Use thin when surfaces can be made to touch with little effort. Use thick when surface is irregular and or more difficult to apply the thin, or when you must apply the CA to the part before it is installed. You should protect your fingers from being

part of the model. A small fan blowing the fumes away from you while using CA is highly recommended. Will not cause blistering, however it is more brittle.

Styrene to styrene – Epoxy. Not recommended under any circumstances. 5 minute, 30 minute, or whatever. . I tested 3 brands of 30 minute epoxy. Pacer Zpoxy 30 minutes. Bond set up time is 30 minutes, therefore I would classify it as a 5 minute epoxy working time and 30 minute set up time. Bob Smith 30 minute. This is truly a 30 minute epoxy, 30 minutes working time and 8 hours to achieve full cure. and finally Ace Hardware 10231 Slow-setting Extra Strength Epoxy overnight cure. All parts were sanded with 100 grit. None of the epoxies produced a successful bond or gluing. Gluing 2 test pieces of styrene 2 inches square by overlapping ½ inch and clamped lightly with 2 spring clamps and allowed to cure for 24 hours. I made a fourth test sample using peanut butter with a cure time of ½ hour. The peanut butter won hands down. Go figure. The excess epoxy beyond the joint seemed to bond better than the joint itself. It may be used as a fillet for cosmetic purposes if strength is not required. Bondo (body filler) would be a better choice.

To summarize: Styrene to styrene – Testors, MEK or CA
 Styrene to wood – CA
 Wood to wood - CA or epoxy
 Metal to Wood – CA or Epoxy

All is not lost. If we readjust our thinking with the above in mind we can turn it to our advantage. CA is ideal for styrene to wood, but the parts should have minimum gap and usually should be zapped in place. To apply CA to a part and then install it requires target practice. Epoxy on the other hand will fill in voids quite nicely and the part can be shifted as required before it sets up. Increasing the surface area of any part attached to the hull will make a stronger joint and also spread the stresses over a larger area however, it is time consuming and difficult to get a good fit with a larger part and it is also heavier. We can have our cake and eat it too. The local hobby shop has sheets of aircraft plywood, usually 6 x 12 inches 1/64, 1/32, 1/16 and up in thickness. Selecting a suitable thickness is based on the severity of the contour and the ability to prebend or score the ply to match the contour with minimum contact pressure. CA will not wick through ply, therefore a large piece would require random holes to allow application of the CA beyond its edges. Burning a hole with a soldering iron, punching, or drilling should be done prior to sanding to remove the glaze.

Two examples on the Soling come to mind for the use of the plywood, the keel box and the rudder block. The keel box and hull are attached by a meager 1/8 inch along its sides. Use a strip of 1/64 or 1/32 ply about 1 ¼ wide of the required length and CA it to the hull before installing the keel box. The slot can be cut before or after gluing in place, your preference. Set the hull at the keel area on a flat board covered with a piece of Saran Wrap or wax paper and press, zap and roll the hull to ensure a good bond between the ply and hull. Now you can use your favorite epoxy to glue the keel box to the ply with assurance that it will be glued properly, fillets and all. You will also be able to move the keel box before it sets up to you liking. A 2 inch square of thin ply CA'd to

the hull before you install the rudder will increase the surface area for stress and let you use epoxy for final gluing. This plywood "shoe" lends itself to many other areas of construction other than solving the styrene-epoxy problem.

The above article was submitted to the AMYA on or about June 12, 2003 for publication. I was informed on August 4, 2003 that the possibility of publication was very slim as there were no drawings submitted with the article. In the event it were to be published, it would be another three months or so before the members would have any opportunity to evaluate its value and form their own conclusions. I feel the subject matter is too important for any further delay.

Leon