

Finishing Indoor Hand Launched and Catapult Gliders

By Bob Warmann as Published in the "Indoor News and Views", Issue 104

Why should a finish be put on an indoor balsa glider flight surfaces? Not for protection but rather for drag reduction at launch velocity and the increase in altitude from the launch. The desired finish will eliminate all peach fuzz like fiber from the surface, seal pores, fill grain cavities and not increase weight significantly. The method to be described meets all of these requirements without requiring an additional ton of elbow grease. Really find it difficult to believe it took me 60 years of building gliders to discover that furniture finishing technique could be used on balsa wood.

My finishing method requires changes in the wing and tail fabrication. They involve the thickness and degree of smoothness of wing, horizontal and vertical stabilizers. Surfaces are all finished to dimension, which is 0.015 of an inch thicker than the desired finished thickness. Example: the wing trailing edge is to be 0.020 inches thick, make it no thinner than 0.035 inches. Finish sanding all fabricated components with 220 grit sandpaper. The rough surface will make the final finishing easier. Wings, which have bass wood or bamboo leading edge reinforcement or were constructed of several pieced of wood glued together should have excess surface glue removed. Use a solvent to soften glue and a single edge razor blade as a scraper to remove the softened glue before sanding of wood with 220 grit paper. Tip: small vertical stabilizers are difficult to hold while sanding; leave a handle on it by not cutting bottom edge of vertical stab from sheet until part is finished and ready for attachment to the glider. The flying surfaces as now sanded are ready for finishing.

The glider finishing method I use is a variation of woodworker finishing technique called "French Polishing." Surfaces to be finished are wet sanded with the finishing solution used as the sanding lubricant. The wet sanding will produce a slurry consisting of the solution and abraded wood particles. The slurry is produced by removing 7 to 8 thousandths of an inch of wood from the surface. Sanding both surfaces in this manner will result in a 15 to 16 thousandths of an inch reduction in the part thickness. It now conforms to the desired finished thickness. The slurry produced by wet sanding with successive grits of paper will be worked into all indentations in the wood. The slurry functions as wood filler, however, when dry, it will only require a light sanding with 600 grit paper to complete the finishing. Polishing with 1600 grit paper can be done but I usually quit with 600 grit.

The finishing solution used must be compatible with adhesives used to assemble the glider. Wet sanding must be done on a clean, flat, hard surface that is resistant to the finishing solution. I have found glass to be the most satisfactory. Sandpaper must be backed with a flat firm block. Mine are fabricated from extruded aluminum rectangular pipe. Glue a different grit paper to each surface. Undercambered wings require a block with some curvature to work the concave surface. Blocks using glass bottles or wood trim moldings are satisfactory. I use oak door threshold stock for mine, but only use undercambered wings for lower ceiling gliders. The finishing solution used consists of polyurethane and mineral spirits mixed in approximately equal parts. Depending on the polyurethane used, the mixture may require adjusting. The polyurethane I used was purchased at the local paint store, McClusky brand. Use the gloss finish and only enough to bond the slurry to the surface after drying. Polishing solution can be applied with cloth, tissue or

brush before wet sanding.

Try the method on a vertical stabilizer first. The step by step method of finishing is as follows:

1. Apply urethane-mineral spirit solution to one side of stab, completely covering surface.
2. Use a 330 grit block. Wet sand in circular pattern the complete side. Remove approximately 0.005 inches of thickness and work slurry into wood grain. Should the slurry become too thick, add more solution.
3. Use a 400 grit block. Wet sand in circular pattern the complete side. Remove approximately 0.0001 inches of thickness. Should the slurry become too dry, you will start rolling small hard balls of material, which will groove wood. Should this happen, apply more solution and continue sanding.
4. Use a 600 grit block. Wet sand in circular pattern but with light pressure. Try to work only the slurry and not remove surface wood. Stop sanding before surface is dry enough to allow rolling of slurry in a small rolls or balls. Complete sanding by removing excess slurry with several strokes with grain.
5. Repeat steps 1 through 4 for other side of stab.
6. Allow 4 hours for finish to dry.
7. Dry sand both surfaces and edges with 600 grit block.
8. Lightly sand with 1600 grit (surfaces and edges).
9. Repeat steps 1 through 8 for wing and horizontal stab. Leave wing flat until finishing is complete.

This finish has not resulted in any problems in gluing parts with nitrate, butyrate, cyanoacrylate, *epoxy* or aliphatic resin glues. When attaching wing to fuselage I remove finish from the bottom of the wing, (sand flat at dihedral joint).

What does this finish weigh? I have no idea. However, this is the only method I have ever used where the finished glider component weights less after finishing than its original weight. You can verify this by weighing piece parts before and after finishing.

My gliders are finished by this method but I stop at Step 7. Finishing beyond this point really does not result in any increase in performance.

Here are a few tips for those individuals who must have that mirror like finish: and all glider components to size using your own method but stop at 400 grit paper. Save all your sanding dust. Now do Step 1, then sprinkle sanding dust lightly on solution applied in Step 1. Skip to Step 4 and complete procedure through Step 9. You will now require a hook and loop sanding block, a foam pad and a 4000 grit Abralon pad. Use the hook and loop hand block with the foam interface pad, Abralon pad applied over both and charged with polishing solution. All that is required now is a ton of elbow grease. Abralon is available from Mirka Abrasives, Inc (800-843-3904) and from Woodworkers Supply Inc. (800-645-9292).