EPOXY IN A NUTSHELL

This is a distillation of my experience in using epoxy for 30 years and improving my techniques. I started using epoxy for boatbuilding in the 1960s. This was before Gougeon came out with their West® system. I was using generic epoxy from Defender and an amine hardener that was mixed 1:10 with the resin. Later I switched to Epon® resin and Versamid® hardener from a surplus outfit in CA. This was a 2:1 mix and far easier to use.

Then, as now, all resins and hardeners were made by a few major chemical companies. The companies selling products at retail develop their formulations from commercial products.

Resin and hardener are ingredients that have to be mixed in the correct proportion to cure to a solid with the desired strength and hardness. If you want the mix to cure faster or slower, you pick a different hardener. You don't change the mix ratio.

Epoxy is far superior to polyester resin because it sticks to just about all materials, while polyester is not even a reliable adhesive for laminating glass cloth to wood.

If you mix your epoxy in the correct ratio it will eventually cure. If the catalyst you add to polyester does not kick it off, it will never cure.

Epoxy resin and hardeners have shelf lives of many years. I am still using a two-part surplus military epoxy putty that was manufactured almost 25 years ago. The only exception to unlimited shelf life I have found with epoxy resins is that the hardener for 1:1 mix systems thickens and cannot be used after about a year.

GLUING & LAMINATING

The most important use of epoxy resin is as glue, including gluing fiberglass to wood. Its advantage over most other glues is that it will fill gaps; in fact, there always has to be some gap. If you clamp too tightly the epoxy will be squeezed out so that the joint will be weak. Adding filler to epoxy used as glue makes stronger joints, perhaps because the filler keeps too much resin from squeezing out of the joint. One-inch boards edge glued will break apart in the joint when it is flexed; add about 20% pulverized limestone or talc and the glued joint breaks in the wood. I add about 10% limestone to resin when laminating fiberglass onto wood, also.

FILLERS

Fillers are added to epoxy resin to make putties for two kinds of uses that have greatly different requirements. Those used for structural joints alone or in combination with fiberglass should be as strong as possible. Putties used for filling and fairing must sand easily.

The best filler for structural uses is pulverized limestone (flour fine, not gritty as ground limestone is). It mixes to a putty that doubles the resin volume and is dense and strong. It is universally available as a fertilizer material at under a nickel a pound. It is a real bear to sand. Portland cement is pretty much equivalent. Talc, another mineral, is as strong and sands easily. It also is thixotropic (the putty does not flow, but will spread). It is available from fiberglass supply houses at around a dollar a pound. For small amounts buy generic baby powder. Check that contents are talc and fragrance. For filling and fairing

applications hollow bead type fillers sand most easily because they are hollow and break. There are three kinds of beads: thermoplastic (Microlight®) which can soften with heat; phenolic, which are usually dark-colored; and glass (Scotchlite®), which are white. The glass beads make the lowest density filler and are the lowest cost. White wheat flour from the kitchen is a pretty good filler for finishing putties.

STRUCTURAL JOINTS

A fiberglass-epoxy butt joint of plywood can be as strong as the plywood itself. See "Invisible Butt Joints" above. Right-angle joints in -1/4" plywood for rowing seat boxes, etc. can be made with just a 1/4" radius bead of epoxy putty on the inside of the joint. I tack such a box together with brass brads and then make the epoxy fillet joints. For angle joints such as chines in -1/4" plywood a 1-1/2" fiberglass strip laid over a -1/4" radius epoxy fillet on the inside and a 1-1/2" strip on the rounded outside edge gives a joint that breaks by pulling the plywood apart. Bulkheads secured by a 1-1/2" glass strip over a -1/4" radius epoxy fillet on each side fail in the plywood. All joints must have the weave of the glass cloth filled smooth for maximum strength. Many designs specify much more glass than needed. Make up short specimens of your joints, cure them, and test them-in a vise, by standing or jumping on them, or by running your truck over them. If the joint holds and the material breaks, your joint is strong enough.

SAFETY

The principal hazard of working with epoxy resins is from skin contact. The hardeners are the offenders. As a general rule, the lower the mix ratio, the less the hazard (2:1 is less apt to irritate than 4:1), but you should avoid all skin contact and wash thoroughly after any contact. Wash thoroughly before eating, drinking, or going to the bathroom. Gloves and clothing help protect you, if they are clean.