

Epoxy Inlay

Tough, fast-drying resins can replace traditional wood accents

by Jeff Miller



Alternative to wood inlay: Epoxy resin mixed with a colorant like graphite produces nearly the same effect as wood inlay.

I've been designing furniture with decorative inlays for years. At first, I used wood strips for the inlay material, just as you'd expect. That was until I began a series of cherry pieces with intricate ebony inlay. Suddenly, I was yearning for an easier approach. So I began experimenting with other materials, and the best results came from epoxy.

Using epoxy means there is no careful sizing of wood strips to groove width, something of a problem when the strips are $\frac{1}{16}$ in. to $\frac{1}{8}$ in. wide and the grain isn't perfectly straight. Splicing, cutting to length and mitering are all eliminated.

Epoxy is an attractive alternative, but it isn't foolproof. There can be bubbles and voids, and the color occasionally bleeds into end grain. With practice, you can cope with these problems.

Epoxy resins are highly allergenic, and they are strong irritants. Wear gloves when handling epoxy, and use a good respirator. The resins give off fumes when mixed and when curing. Dust from epoxy is also an irritant. So take precautions when sanding.

Performance varies with the epoxy

Epoxy is well-suited for use as inlay. It doesn't shrink as it hardens, it adheres well without requiring pressure, and there's enough elasticity to cope with cross-grain movement. Many pigments and materials can be mixed in to create a variety of colors and effects.

I've tried a range of commercial products, from hardware-store brands (both quick and slow set) to more specialized formulations. Most give adequate results. I've had the best luck with Star E150 epoxy filler (Liberon/Star Supplies, P.O. Box 86, Mendocino, CA 95460; 800-245-5611). It has a rather thick consistency (a little thicker than peanut butter), but it spreads easily, doesn't show many bubbles and tends not to bleed into end grain.

Different products have widely different cure times, mixing instructions and viscosi-

ties. A more liquid epoxy is easier to apply, but it tends to bleed more into end grain. The thicker stuff won't bleed as much and won't run out of an open groove as easily, but it's a little harder to apply.

Carefully cut and trim the grooves

I rout grooves with a sharp $\frac{1}{8}$ -in. or $\frac{1}{16}$ -in. straight cutter, using either a fence to guide the router along the edges or a pattern and a bearing-guided bit (see the near right photo). Depths of $\frac{1}{16}$ in. to $\frac{3}{32}$ in. seem to work best. That's deep enough for a good bond, and there's enough material to allow for aggressive sanding if necessary. Corners may be cut square with a sharp chisel (see the bottom left photo).

No matter how the grooves are cut, the surface probably will need sanding. It's also a good idea to run some 320-grit paper lightly in the groove to eliminate any remaining fuzz on the walls of the groove.

The biggest drawback with epoxy is that the unhardened resin will creep into any inconsistencies in the groove. Chips or wavering lines that look inconsequential when they are cut can turn into glaring problems when filled with a dark resin. That's why it pays to look over and repair the piece carefully before going too far. You may even need to patch imperfections with solid wood.

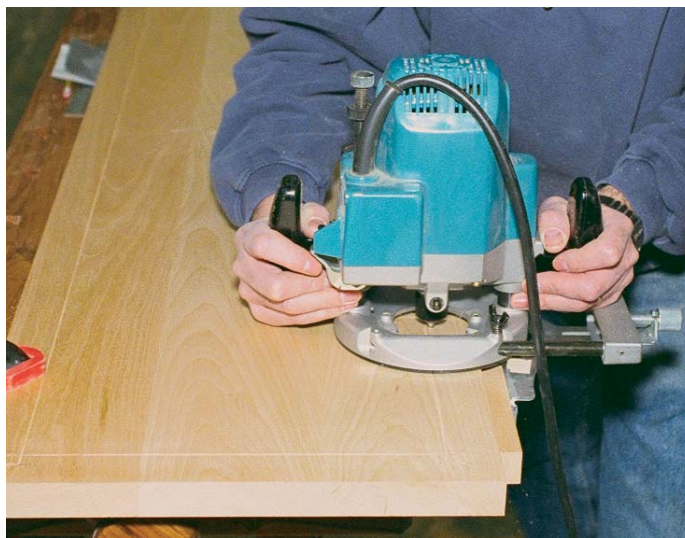
Colored resin can bleed into end grain, exactly what you'll find along the length of a cross-grain groove. This problem isn't serious with a clean cut in a fairly closed-pore wood like maple, but it is serious with open-pore woods like oak (so much so that you should choose a different species of wood when using this technique).

Try a test piece. End grain can be sealed with a clear coat of epoxy applied with a cloth in the groove. Be sure to wipe off the excess. I allow the epoxy to cure until it's set, but I don't wait until it becomes completely hard because the inlay won't adhere as well.

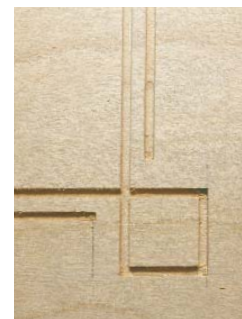
Mix epoxy, and then add color

After the grooves are prepared, the next step is to mix the proper ratio of resin and hardener to make the epoxy (see the top left photo on the facing page). Check the directions carefully because the ratio varies widely from product to product. Once thoroughly mixed, any number of additives may be blended in. I've found that graphite powder makes a good black colorant. Both artist's acrylics and universal

CUTTING AND PREPARING THE GROOVES



A router cuts the grooves. A $\frac{1}{16}$ -in. straight bit and an edge guide on the router help make grooves of uniform depth. They still must be cleaned up.



Clean grooves carefully before trying epoxy. The end of a small file ground to form a narrow chisel squares up corners. Fuzzy edges and the bottoms of the grooves should be cleaned up with 320-grit sandpaper.

ting colors are effective and result in smooth colors. Any basically non-reactive powder will work.

Color consistency can be a problem, so if you mix up a color, make a recipe. One batch usually is enough, but you may need to do some touch-up work the next day. And if the piece is large, the epoxy may start to set before you can finish. A number of batches may be needed.

Apply epoxy mix with a stick, and watch for bubbles

After mixing the Star epoxy and colorant, I use the same stick to spread the resin. I

press the resin firmly into the grooves, leaving some extra on the surface to allow for settling (see the bottom left photo on the facing page). For epoxy that's not as thick, I've used a plastic-tipped syringe or an empty squeeze bottle. For really big jobs, empty caulk tubes can be used.

The biggest potential problem is trapped air bubbles in the resin. Mainly, these are from air whipped in during mixing. Waving a lighted propane torch over the epoxy after it has been applied almost magically releases the bubbles, but do this carefully. Keep the torch 6 in. away from the surface, and keep it moving fairly rapidly. Try not to

FILLING AND SANDING THE EPOXY



Mix epoxy and colorant thoroughly. Proportions of resin and hardener vary with the type and brand of epoxy, so read directions carefully.



Press resin firmly into grooves. Use the same stick to mix the resin and push the epoxy into the grooves.



Sand off the excess and inlay emerges. Although hardened resin can be sanded by hand or scraped, the author prefers his stroke sander. Before sanding, allow the epoxy to harden thoroughly, so it won't be pulled from the grooves.



Now's the time to repair minor flaws. Air bubbles can leave tiny craters in the finished resin. After the surface is sanded, examine the inlay, and patch any faults with a new mix of epoxy. When it's hardened, carefully sand the surface flush.



Careful preparation pays off. If grooves have been cut and cleaned properly, the result is clean and crisp.

heat up either the wood or the epoxy. You should see lots of tiny bubbles exploding. Go over all of the inlay lines a few times, but don't get carried away. I don't have to do this with the Star epoxy.

After the resin has cured, clean off the surface

Let the epoxy set overnight, or long enough so that you can work it without having it gum up or pull out of the grooves. Planing, scraping and sanding all can be used to clean off the excess (see the center photo above). I don't plane too close to the surface for fear of cutting into it. Scraping

works well, but it can leave little ripples as the scraper follows bumps in the epoxy. Sanding is effective, but it has two problems: The colored epoxy dust gets into the pores of the wood, and the dust is dangerous to breathe. Dust can be blown off with either compressed air or light scraping. A good dust mask is essential.

As you clear off the mess you've made, you will see the full effects of your inlay, as well as any voids, imperfections and air bubbles. Repair is simply a matter of going around carefully with a new batch of colored epoxy (see the top right photo). For adhesion, I use a pin to scratch the areas

that need touch-ups. A toothpick or shop-made equivalent is perfect for applying the epoxy. If the defect is very small, the pin should work fine. After another round of sanding—scraping is likely to pull out your touched-up spots—you should be ready to apply finish.

Oil finishes work well over epoxy inlays. Lacquer may form pits around the smallest bubbles. Check carefully for these after the sealer coat, and fill them in as needed. □

Jeff Miller designs, builds furniture and teaches at his studio, J. Miller Handcrafted Furniture, in Chicago.