

Epoxy /Metal Inlay

By David J. Marks

- 1 Cut metal tubes to length. Insert 7/32" diameter aluminum tube into the 1/4 "square brass tube. Mill a piece of hardwood 12" long x 1 1/2 "wide x 3/4" thick. Set the table saw blade to 45 degrees and 3/8" high and rip two cuts down the middle creating a V groove. Tape the metal tubes into the V groove and cut them to length at the band saw. A blade with 6 teeth per inch will work. Allow enough length to trim off a minimum of 1/8 ". For turnings that will be bored at a 45 degree angle this means enough length to be seen on the inside as well as the outside so the length will be approximately 1 1/2 ". For flat inlay work allow 1/4" minimum depth and 1/8" to trim off so the length would be 3/8".
- 2 Fill the 7/32" aluminum tubes with colored epoxy. Make sure you use a slow setting epoxy. The pigments must be compatible with epoxy. I have had success with Mixol pigments available thru Woodcraft stores as well as automotive pigments, dry powdered colors (Mohawk and other finishing supply companies supply these) and Mica powders. Mica powders are ground up from Mica stone and treated with titanium dioxides to color them. When using liquid pigments, use the smallest amount necessary to create an opaque color (not translucent). If you add too much liquid pigment to the epoxy, you will soften it. The epoxy can be dripped into the tubes by gravity or injected.... I use a thin metal rod (1/16") to stir the glue and drip it into the tubes. Sometimes I'll use a vacuum cleaner to draw the glue into the tubes. Once it begins to run out of the other end, then I will dam the end with a piece of masking tape. Next I'll clean the outside with acetone to remove excess glue then stand it upright to dry by setting it into a piece of Styrofoam . For the injection method: mix the colors into the epoxy, then use a glue syringe (available thru Woodcraft supply). Remove the plunger from the syringe and pour the epoxy into the syringe. Next place the plunger back in to the syringe and hold it upright until the air bubble moves to the top. Then push out the air. With nitrile gloves on place your finger over the tip of the syringe and then pull back on the plunger. This will create a vacuum in the tube and draw the air bubbles towards the plunger. Now you can push forward and inject the epoxy into the tubes. Once it begins to come out of the bottom of the tubes then you can dam the ends with masking tape, clean them with acetone and stand them up in a block of Styrofoam to dry.
- 3 Once the glue has cured overnight, you can glue the aluminum tubes into the brass square tubes. You will need to test the fit and see if they will go together. If not, it might be necessary to file the inside edge of the brass tubes with a small needle file. Follow the previous procedure except this time you will want to use a contrasting color.

- 4 Drilling the mortises. This can be done using a mortising machine for flat work. For turnings, I like to use a drill press with a mortising attachment. These attachments are available thru Woodcraft for about \$70.00. They are cast iron and sometimes they might need a little help fitting them on the quill. I find that the paint that is sprayed on them, can sometimes be over sprayed onto the inside surface, causing them to resist being mounted. Take a wooden dowel and wrap some 220 grit sandpaper around it and use that to sand the inside of the area that clamps onto the quill. Once it fits, bolt it in place. Regarding the mortising bits, I find they need a little help as well. I like to hone the outside to sharpen them up. I prefer water stones but I'm sure that oilstones would work as well. There is a cone shaped grinder that can be used to hone the inside of the hollow chisel mortising bit. One more thing, the drill bit doesn't always stay within the square pattern of the mortise, so I take the drill bit to the grinder and remove some metal from the outside diameter in order to make it small enough to fit within the mortise perimeter. I think because the drill bit is thin, it can vibrate and cut a small crescent shape outside the mortise which ruins the clean fit of the inlay. When you install the mortising bit in the drill press, seat the bit all the way in and lock it place with the set screw (option: you can rotate the bit to crate a diamond shape). When you install the drill bit, seat it all the way, and then drop it down 1/32" for clearance.
- 5 Once the square holes are cut, the next step is to seal the end grain with a thin coat of shellac. A 1 pound cut works well, if you have a thicker mix, add some denatured alcohol to it, to thin it down. Brush a lite coat on (in and around the hole) let it dry and then give it 1 or 2 more coats to be on the safe side. This is a very necessary step because the pigment in the epoxy can bleed (be absorbed) into the end grain which would muddy the borders of the inlay.
- 6 The final step is to glue the inlay into the holes. If you have only filled the round tubes with colored epoxy, then you can combine the last two steps by mixing the pigment into the epoxy dripping some into the square stock, inserting the round tube, twisting it to spread the glue, then place some epoxy in the hole and lightly hammering the assembly into the holes. Once the glue has cured, then take a hacksaw or go to the band saw and trim it flush. The remainder can be leveled with a file; it can be smooth with a scraper and finished off with 120 grit sandpaper wrapped around a flat hardwood block. I think it is important to use a hardwood block with sandpaper because the wood will wear away faster than the epoxy and metal due to the fact that they are (in most cases other than say ironwood) harder than the wood. After everything is leveled and smooth at 120 grit, you can progress thru the various grits to 320 or finer for the final sanding.