



Birds of Prey Coasters

patterns by Bob Valle; cut and finished by John Polhemus

Introduction

A visually appealing scroll saw project with a functional purpose is a hard combination to beat. I consider it a huge bonus when the project is suitable for stack cutting in order that a bunch of them can be cut in a short time. Good thing that's the case with these coasters, because I have a feeling I won't be the only one making a lot of them as gifts!

The casting epoxy technique used on the coasters can be applied to other projects, as well. The finish leaves the fret-cut pieces protected with a clear, durable coating, which works perfectly for items that will be in contact with moisture. I have also included instructions for making a leveling jig to assist with the application of the epoxy, and the jig can easily be modified to accommodate other pieces.



SUPPLIES

Wood: wood of choice—two pieces 1/8" x 4-1/2" x 4-1/2" (for each coaster); scrap wood—one piece 1/2" to 3/4" x 6" x 5" (for leveling jig), one piece 1/2" to 3/4" x 2-1/4" x 2-1/4" (for support block on leveling jig)
 Tools: drill press with 1/16" and No. 60 bits; scroll saw with No. 2/0 and No. 5 skip-tooth blades; small level; propane torch (optional, but recommended)
 Temporary-bond spray adhesive
 Sandpaper, assorted grits

Nails and hammer, or packing tape (to secure wood stack)
 Stain in color to contrast with wood
 Brushing lacquer
 1" paintbrush
 Painter's tape
 EasyCast clear casting epoxy
 1"- to 1-1/2"-long wood screws, three

Please refer to all manufacturer's labels for proper product usage.

Background image supplied by ©istockphoto.com/lakov Kalinin.

INSTRUCTIONS

Cutting

Step 1. Before applying the patterns to the wood, finish sand the work pieces. This is a good habit to get into, because it leaves only touch-up sanding to be done after cutting. Even touch-up sanding can rattle your nerves when sanding pieces as delicate as these coasters. (See the "Touch-Up Sanding" sidebar on page 23 for a few stress-relieving tips!)

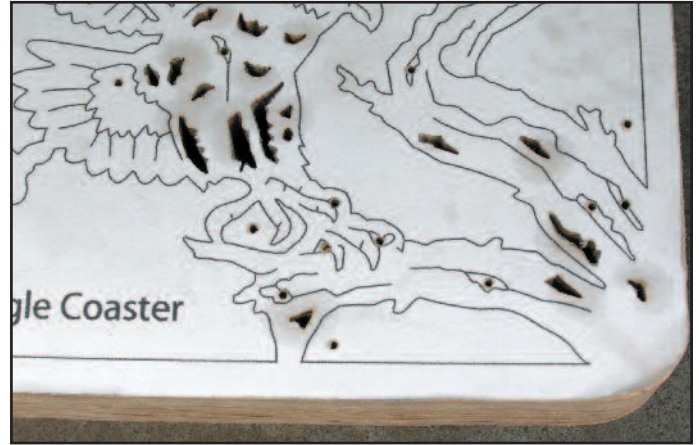
Step 2. Photocopy the patterns, saving the originals for future use. I chose to stack cut the coasters, making several of each design at one time. There are many ways to secure the stacks of wood, such as placing pieces of double-sided carpet tape between the layers, applying hot-melt glue to the edges of the stack, wrapping the stack with packing tape, and, my personal favorite, inserting nails into the waste areas of the design. Stack the wood using your method of choice, and attach the pattern to the top of the stack using temporary-bond spray adhesive.

Step 3. Many of the blade access holes that need to be drilled are very close together and in very small areas. That can be a problem when stack cutting because such a small drill bit can quite easily be deflected and come out in the wrong place on the bottom of the stack. To help prevent drill bit deflection, place the drill bit in the drill press chuck so only 1/4" of it is extending from the chuck. Set the depth stop so the chuck won't accidentally touch the pattern, and drill your holes a little less than 1/4" deep. Lengthen the amount of the drill bit extending from the chuck by another 1/4", reset the depth stop, and drill again. Drilling in short increments maintains as much rigidity of the drill bit as possible and allows the drill bit flutes to clear in between drillings. Continue until all the blade access holes for the design are drilled.



Step 4. Prior to threading the blade through the holes for cutting, it may be helpful to round over the corners and edges on the end of the blade using a small rotary-tool grindstone attachment. By rounding over the blade's edges, it will slide right through even very small blade access holes without "grabbing" the sides of the hole.

Step 5. Understandably, a piece of wood becomes less stable as you cut sections out of it. Planning the progression of cuts in advance will lessen the chances that your project will break while you're working on it. When cutting



these coasters, I recommend starting by cutting the tiny areas that aren't much larger than the diameter of the drill bit, skipping the ones that have veining cuts attached to them.

Step 6. Next, cut any other small areas without veining cuts attached to them and that aren't connected to the outer edge of the bird's body. (If the drill bit had deflected in any of the tiny areas during drilling, it would be evident at this stage. If necessary, slightly reshape the holes as needed to fix them.)



Step 7. Proceed to cut the tiny areas with simple veining cuts attached to them. (If any of the blade access holes had to be reshaped, it is possible that some of the veining cuts may need to be adjusted, as well.)



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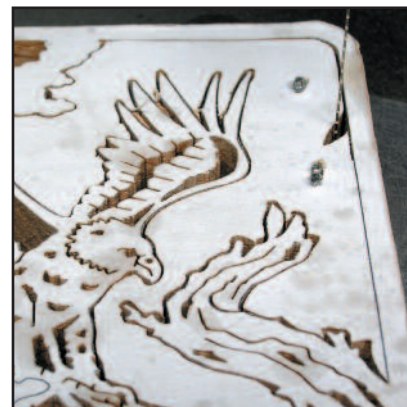
Step 8. Continue by cutting the larger areas that have simple veining cuts attached to them. (Notice that I didn't make the veining cuts as I came to them, and that there is no thin kerf line behind my blade following the pattern line. When stack cutting or cutting thick stock, I shave the kerf a little wider into the waste area as I come to tight curves and corners. This greatly decreases the friction on the blade as a turn is made, which means the blade stays cooler than if I follow right along the pattern line. With less heat, the blade stays sharper and lasts longer, and blade deflection is decreased dramatically.)

Step 9. Once the waste area has been cut away, it's a clear shot to make the veining cuts.



Step 10. The areas with more complex veining cuts should be tackled next. These cuts will affect the stability of the wood to a greater degree. As before, cut away the waste area, then make the veining cuts. There are some areas with complex veining cuts that are close together. For these sections, it's a good idea to first cut away the waste areas in each of them. When going back to make the veining cuts, keep your fingers close to the blade to provide support and prevent the upstroke of the scroll saw from breaking the area you're cutting.

Step 11. Lastly, make the cuts surrounding the bird's body. Note that two of those areas in each stack contain the nails securing the stacks—one area with two nails, and one with one nail—and those cuts are saved for last. Although the area with two nails was the last section to be cut, I cut most of that area before cutting out the area with just one nail. This way, the two nails keep the pieces of the stack from rotating while cutting, but only one short final cut is required to remove that last section. Also note that I cut a small access hole to make it easier to reinsert the blade for the final cut.



Notable Cuts!

There are two cuts on the bald eagle coaster pattern that I want to mention specifically: the veining cut at the back of his head, and the area with veining cuts right beside it. The photograph shows where I cut out the waste areas in both sections, and I'm about to make the veining cut at the back of his head. Between the thickness of the stack and the fact that there is no room to make relief cuts, this cut is a "blade killer!" I put in a fresh blade, and made the cut. The wood has been flipped over in the second photograph to show the bottom of the stack and the condition of the blade—as you can see, the blade did its job, but paid the price for doing it! It will be necessary to change the blade again before making the veining cuts in the area beside it.



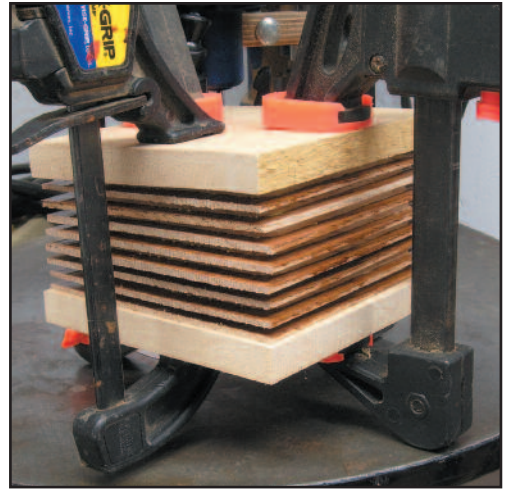
Assembly

Step 12. Remove all patterns, and give the wood a touch-up sanding. Remove all sanding dust. Apply stain to one side of each backer work piece to provide contrast to the fret-cut bird pieces, and let dry completely.



Step 13. Apply a line of glue along the entire perimeter on the back side of the bird piece. Also apply dabs of glue in several areas on the back side of the design.

Step 14. Place the glued side of the bird piece on the stained side of the backer, positioning it in the center of the backer work piece. Set another backer piece on top of the assembly, with the stained side facing up. Apply glue to the back side of another bird piece, and position it on top of the backer. Continue until you have stacked your desired number of coasters, and clamp the assembly between pieces of scrap wood. Allow the glue to dry completely.



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Touch-Up Sanding

I mentioned earlier that I'd share a stress-relieving tip or two for sanding fretwork. For many years, my primary method of sanding was using a 6" x 48" belt sander fitted with a fine-grit belt. I had installed a double pulley on the motor, and replaced the sanding disk with a 10" pulley. With a simple belt change, I could slow the sander speed down to a crawl when needed. If I was particularly worried about sanding a delicate area, I'd save the waste wood cut out from around the area and re-insert it for support while sanding. The waste wood needed to be large enough that it couldn't twist or rotate, though—otherwise, it would break the section I was trying to protect! The waste wood trick also works well when using a palm sander. While it can be a bit of a pain to deal with some loose pieces while sanding, it is better than having to do a repair job or re-cut the piece.

I still use my belt and palm sanders, but these days, I do most of my sanding using a "Sand-Flee" drum sander from R.J.R. Studios, LLC (609-801-1800). It places less physical stress on fretwork than of any other sanding method I know. I'm so impressed with it that I think every scroll saw manufacturer should be required to sell one with their saws! It makes a lot of sense when you think about the way the thing works—it's kind of a cross-hybrid between a jointer and a belt sander. *Velcro*-backed sandpaper is wrapped around a drum inside a steel box. A heavy, nickel-plated steel table with a narrow gap is then closed over the box and drum. The table replaces the function of the platen on the belt sander, and functions instead like the tables of a jointer. The fretwork is placed on the front side of the table and slid over the gap and the sandpaper onto the back side of the table; it's like passing wood over the knives of a jointer. There is only a very small and momentary point of contact against the sandpaper across the width of the wood as it passes over the drum. Compare that to the stress the full surface of the sandpaper on a palm sander or belt sander puts on your fretwork! A grip-pad (instead of the waste wood trick) can be used for additional support when sanding very delicate fretwork on the *Sand-Flee*. Grip-pads for sanding large pieces of fretwork can easily be made by gluing a sheet of sandpaper or a thin piece of foam rubber to a piece of plywood and attaching a block of wood as a handle.



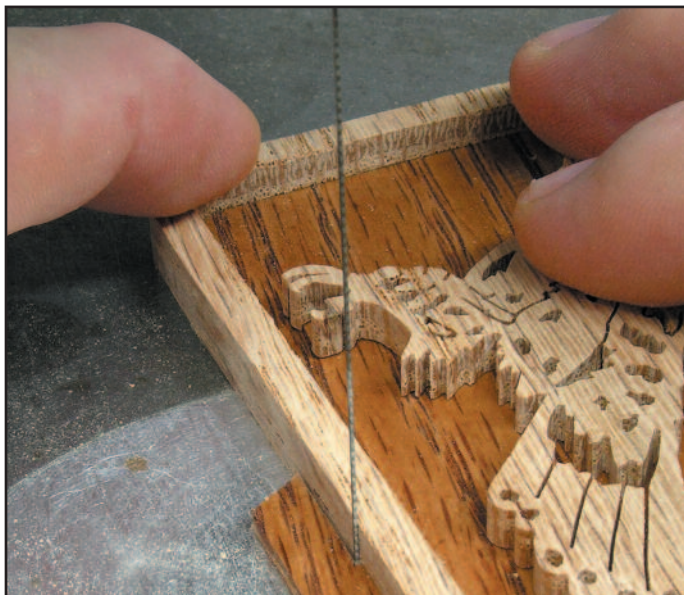
Velcro-backed sandpaper is wrapped around a drum inside a steel box.



A steel table with a narrow gap is closed over the box and drum.



Grip-pads can be used for additional support.



Step 15. Unstack the coasters. Using the outer edge of the bird piece as a guide, cut the backers flush with the edge of the bird piece using a No. 2/0 blade. Lightly sand the edges that were just cut. Also sand the bottom of the backer.

Finishing



Step 16. Apply brushing lacquer to the coasters to seal them, and let them dry completely. (Refer to the "Selecting a Finish" sidebar for sealer and epoxy recommendations.) The top of each coaster should be as reasonably level as possible when pouring the epoxy, so I created a simple leveling jig comprised of three legs to hold the coasters. (The pattern for the jig is provided in the pattern section.) One of the legs is shorter than the others, and is aptly labeled "Short Leg" on the pattern! The square dashed outline on the leveling jig pattern represents the placement of a support block to hold the coaster up off the legs, and it also indicates where the support block should be glued to the legs. Attach the jig pattern to the wood, and drill a 1/8" hole at the cross-mark on each leg. (A wood screw will be inserted through each

hole to adjust the level.) Cut along the solid lines of the leg pattern, and make tiny marks at the dashed lines to aid with aligning the support block on the legs. Remove the pattern, glue the support block in place, and let dry. Insert a wood screw through each hole so it protrudes approximately 1/4" through the legs.



Step 17. Protect your flat work surface with paper, and set the jig on the paper. Center a coaster on the support block, and square it to the edges of the block. Place a

Selecting a Finish

The finish for the coasters needed to be durable, protect the fretwork, and provide an easy-to-clean surface. What came to my mind was the epoxy finish sometimes seen on restaurant tables and bar tops. I hadn't used an epoxy finish before, and needed some advice from someone familiar with working with fretwork. Folks at Craft World (800-654-6114) recommended a product called "EasyCast clear casting epoxy." A real advantage to this product is that it does not produce the terrible smell that is frequently associated with epoxy finishes. I was advised that the wood needs to be sealed with a clear wood grain sealer before applying the epoxy, otherwise the end grain of the cut-away areas and the veining cuts would allow air within the pores of the wood to continually escape as the epoxy cured, creating tiny bubbles. A brush-applied sealer works best, because it can be worked into the veining cuts and into all the tiny cut-away areas. There are many products specifically designed for sealing wood grain, but I chose to use brushing lacquer in order that I could also use it for finishing the edges and bottoms of the coasters after pouring the epoxy. It's available in the paint section of just about any hardware store.

small level on top of the coaster. The two legs closest to the corners of the support block are the longer legs. Level the coaster side to side by adjusting the two screws on the longer legs. Rotate the level 90°, and level the coaster front to back by adjusting the screw in the short leg.

Step 18. Mix the epoxy following the manufacturer's instructions. With the coaster positioned on the jig, slowly pour the epoxy into each of the cut-away areas, then over the surface areas until the epoxy starts to run over the edges and drip off onto the paper. To aid in spreading the epoxy along the surface and over the edges, you may want to use the end of an old scroll saw blade. The epoxy will be thin and uneven on the edges because they're vertical surfaces, but don't worry about it—the sides will be smoothed out later. Let the epoxy settle for a few minutes, allowing it to level out and begin dissipating any bubbles introduced during mixing and pouring. If needed, pour additional epoxy over the surface and allow it to settle. EasyCast is formulated so most air bubbles will dissipate on their own, but it is possible that there could still be some stubborn ones visible twenty minutes or so after pouring. To remove them, use the end of an old scroll saw blade to work deep bubbles up to the surface and pop them. Carbon dioxide will also dissipate a bubble, so exhaling on it will work, too. However, if you're making a lot of coasters that could make you very dizzy! Instead, pass a propane torch back and forth over the bubbles, moving the torch very quickly. I emphasize the word "quickly" because it's the carbon dioxide produced by the flame that you want, not the heat! Allow the epoxy to cure overnight.

Step 19. After curing, touch some of the epoxy that has dripped onto the paper to be sure it is hard and not tacky before handling the coasters. There will be some small epoxy drips on the bottom of the coasters. While you can sand them off, it's much faster to use a rotary tool with a 1/8" straight cutter to remove them. Remove the drips, and finish sand the bottom of the coasters. Use 120-grit sandpaper to sand the epoxy on the edges of the coasters so they're smooth to the touch, then finish sand them using 220-grit sandpaper. (They just need to be smoothed out, not sanded down to bare wood. The brushing lacquer will remove the white cast of the sanded epoxy.) Remove all sanding dust.

Step 20. Apply a layer of painter's tape to the top of the coasters to protect the surfaces from being marred while applying brushing lacquer to the sides and bottom. While holding a coaster bottom-side up, use a 1" brush and short, downward strokes to apply brushing lacquer across the edges of the coaster. Set the coaster on the leveling jig, and apply brushing lacquer to the bottom of the coaster. Allow to dry, then apply a second coat. Alternatively, a thin cork sheeting can be glued to the bottom of the coasters, or flocking can be applied, as opposed to using the brushing lacquer. Allow the lacquer to dry completely before using your new coasters.

For questions concerning this project, send a SASE to John Polhemus at 3000 Charleton Ct., Waldorf, MD 20602, or email him at fretsawyer@verizon.net. To contact Bob Valle, email him at valle1968@yahoo.com.



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