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Claude Dupuis

Three Segmented Vases

Woodworking with Metal

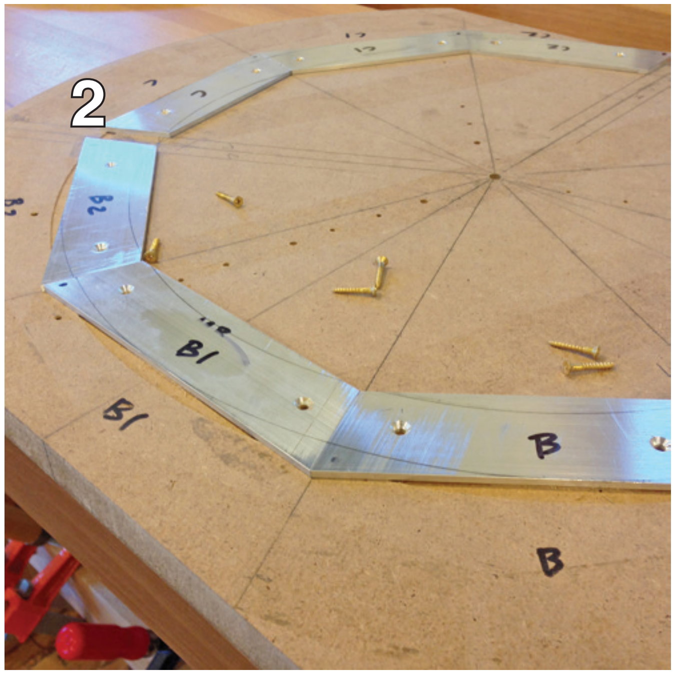
by Mike Korsak

I have always shied away from making my own metal hardware or accessories for reasons any fellow woodworker might understand—I didn't have much experience with metal and didn't have metalworking tools. But two recent projects have helped to change my views on working with metal. Although I still have a lot to learn and don't have a full complement of metalworking tools, I think my initial efforts were fairly successful and have motivated me to continue to work with metal.

Round Side Table—Earlier this year I was designing a round side table and decided that I wanted to dress up the piece with a decorative bead added to the bottom of the circular apron. In keeping with the somewhat modern design of the table, I decided the bead should be made of aluminum because it would be a bright, shiny contrast to the other materials used. Having made the decision at the design stage, I promptly closed the door on all the little questions that started to come to mind—how would I work the material, shape the bead profile, where would I source material? I figured I'd figure it out at the appropriate time.

So when that time came, I turned to the internet for some assistance. Somewhere in the past I had read that typical woodworking machinery can be used to cut non-ferrous metals like aluminum, brass and copper. A bit of reading revealed that this was true, that many people have used traditional carbide-tipped table saw blades and regular, non-carbide-tipped bandsaw blades to work these materials. I also found that there are saw blades made specifically for the task of cutting non-ferrous metals. Since this was a bit of an experiment for me, I decided the investment in a new saw blade was not justified and that I would just use an older, carbide tipped table saw blade and a somewhat used bandsaw blade.

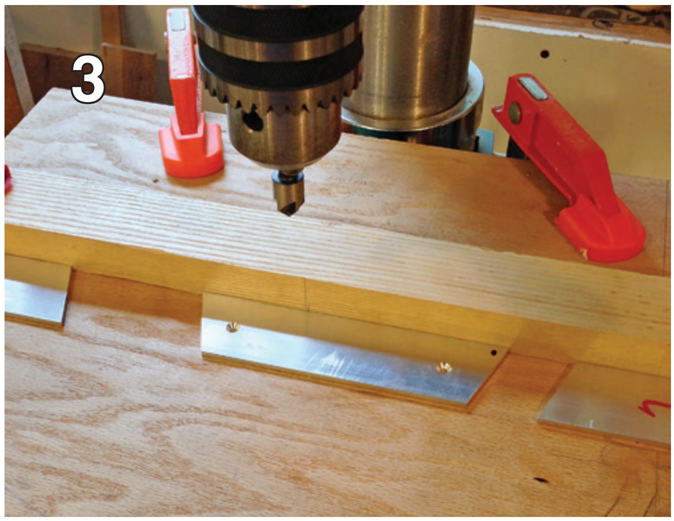
Sourcing the material was pretty easy. I had purchased some steel C-channel from Home Depot in the past, and recalled seeing other materials and shapes in the store. So I checked their website and found that they carry ⅛″ thick aluminum

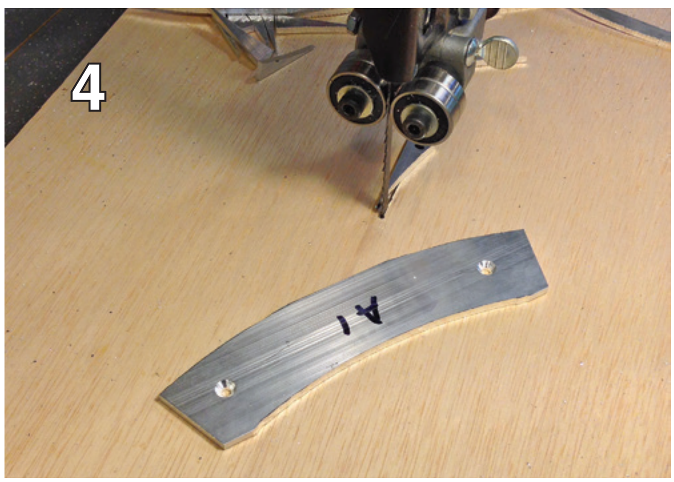


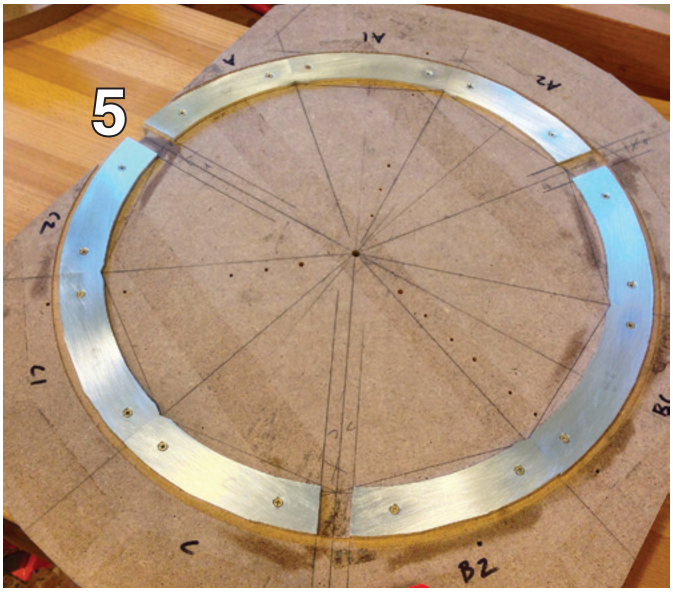
bar stock (and other thicknesses) in various widths and lengths. I opted for ⅛″ thick by 2″ wide bar stock—the finished beads were not 2″ wide, but you will see later why I used that width. Since making these aluminum beads, I've also sourced metal from online retailers like McMaster-Carr and Rotometals.

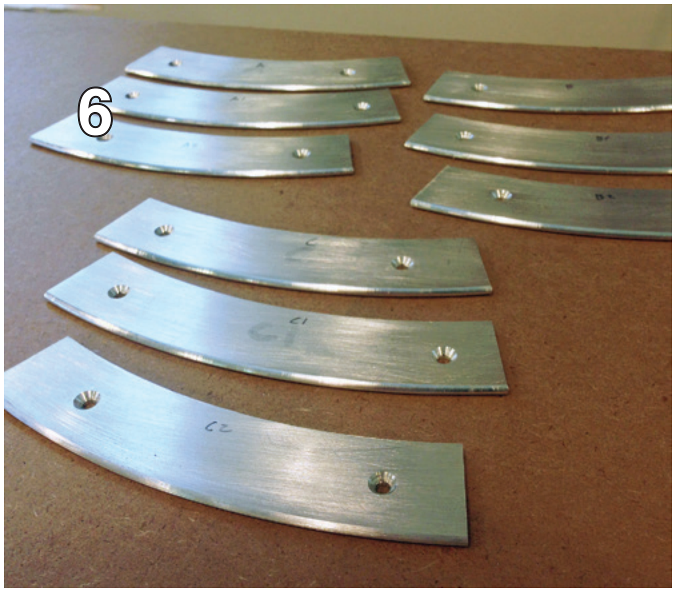
The table's apron is round, and was made by bricklaying three layers of mitered stock, routing the inside and outside edges to specific radii off of a fixed center point, and then veneering both the inside and outside faces (see Photo 1). The beads had to match the inside radius of the apron and have an outside radius slightly larger than the outside radius of the veneered outside face of the apron so that the bead was slightly proud of the apron, for aesthetics. I decided to cut the bead material much the same way I had done for the bricklaid apron—miter the flat stock to make faceted segments of an arch. Since the table legs interrupted the beads, I could work each segment between legs individually, but still use the center point of the table as a common reference (Photo 2).

I had started this table by making a full scale drawing on a piece of MDF which showed the top, apron, leg locations and center point. This piece of MDF had been used throughout the build for various steps, and I used it again to layout where to break up the bead stock into facets, and at what angle to make the miters. With this information, the table saw was used to cut the miters. A miter gauge and stop blocks kept angles and lengths consistent. Once cut, the beads had to be drilled and countersunk to allow for attachment to the MDF for shaping the inside and outside radii. These holes would then be used to fasten the beads to the table apron with screws when finished. The drilling and countersinking was done at the drill press, and offcuts from cutting the miters were used as stop blocks to maintain consistency (Photo 3).







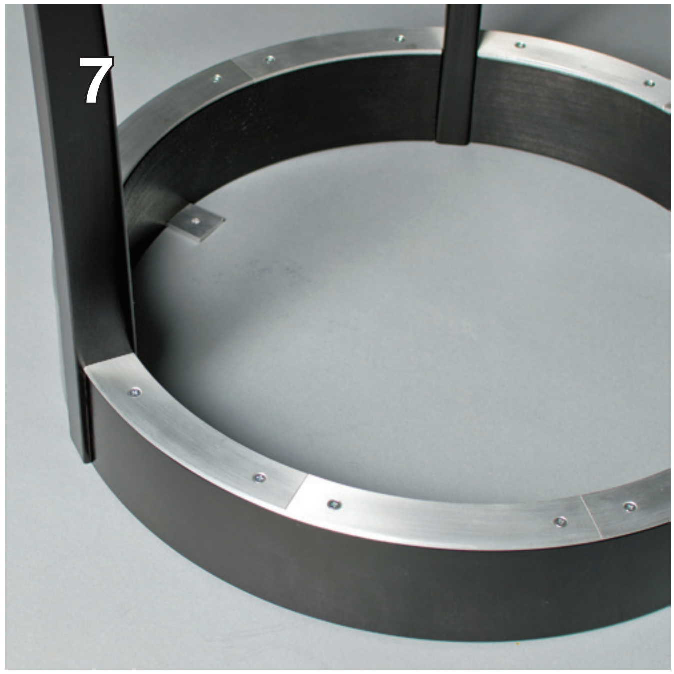


After milling each piece of aluminum was attached to the MDF with two screws. Adjustments to any of the miters were made with files and cleaned up with sandpaper. The inside and outside radii were drawn onto the aluminum beads using the table's center point (Photo 2). The pieces were then removed from the MDF so the radii could be rough cut on the bandsaw (Photo 4). They were then reattached to the MDF (Photo 5) so that the radius cuts could be finished using a router with a trammel. I used a ¼″ diameter carbide up-spiral bit. From earlier reading online, I had found a formula for determining the revolutions per minute (RPM) for a specific material with an end mill (or router bit, I assumed)—RPM = (SFM x 3.817)/D where SFM is surface feet/min. (a variable based on material) and D is the diameter of the bit or endmill. The SFM for aluminum varies and I used 1200 for my calculation which yielded an RPM of 18,320. My router has a variable speed motor so I was able to adjust the RPM when routing the aluminum.

It's probably a good time to mention the *swarf*. Swarf are the chips or filings created when milling metals, and they end up everywhere. I probably spent as much time cleaning out the table saw and bandsaw (especially the bandsaw tires) as I did actually cutting material. When it came time to rout the radii, I was pretty fed up with swarf and did the routing outside.

The router bit left a square edge that had to be rounded over on the outside radius to create the bead profile. I rounded over the square edges with a roundover bit whose radius was larger than I would have liked, so the bead profile was not a true circle, more like a slightly squashed gothic arch. I used files and sandpaper to shape the profile closer to a true circle (Photo 6).

To finish the beads, I sanded up to P800 grit and then buffed with 4/0 steel wool. To try to contain the mess, I laid a piece of MDF on my bench and did all of the sanding on top of that. Since the parts were relatively small, it was easier to lay the sheet of sandpaper on the MDF, hold it with one hand (or stick it in place if PSA-backed) and use my other hand to move the part over the sandpaper. On the final grit, I found that the cleanest



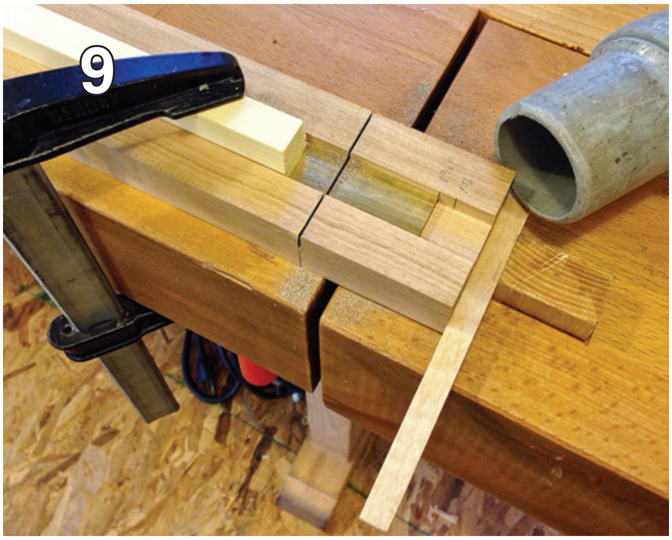
scratch pattern was made by carefully laying the part on the sandpaper, dragging it some distance and then carefully lifting off the sandpaper (instead of moving the part back and forth over the paper, which left marks where the motion of the part changed direction). When installing, there was some minor fine-tuning of fit with files and sandpaper, but I was pleased with the results (Photo 7).

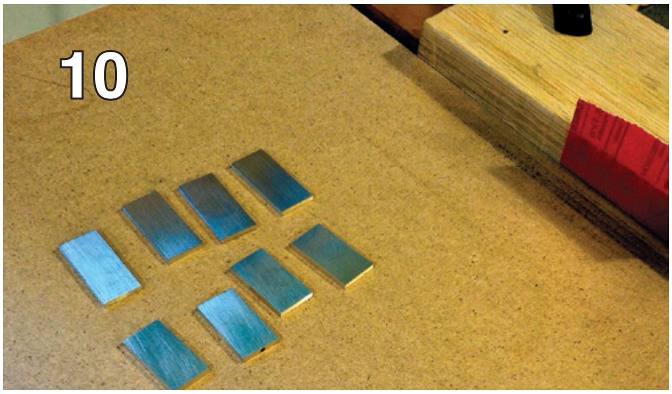
Sideboard—The second piece requiring metal work was a sideboard designed and built such that a veneered curly maple case sat on an ebonized walnut base (Photo 8). The base is built with stretchers located underneath the vertical drawer dividers of the curly maple case, and I had thought about just gluing the case to the base. But I then decided that I'd rather attach the case

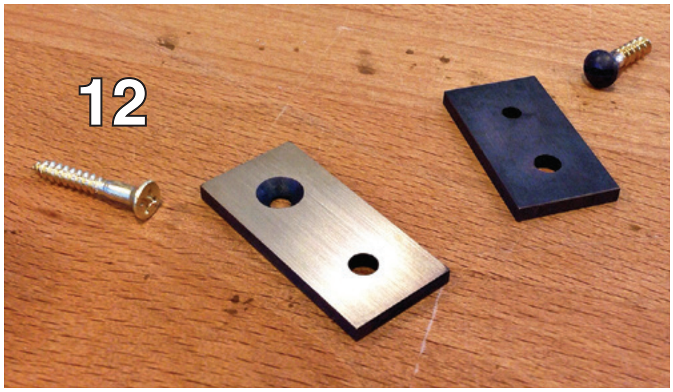
with brass tabs and screws, which would allow for a small amount of seasonal movement, and allow for the case to be removed if either the base or case ever required repair. While I think wood buttons could also serve the same purpose, it is my belief that brass tabs are a more elegant solution and, in hindsight, probably more efficient time-wise.

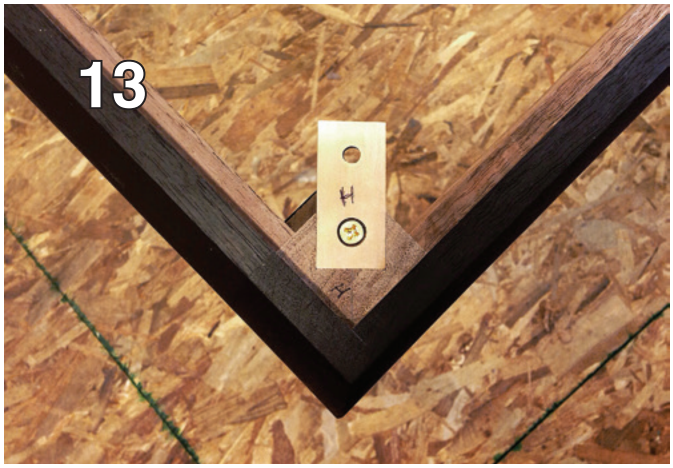
Making the brass tabs was much less involved than the aluminum beads on the side table. I ordered the ⅛″ thick x ¾″ wide brass stock from McMaster-Carr. I cut the stock to length using a hacksaw in a dedicated miter box (Photo 9). Notice the shop vacuum hose visible in Photo 9—an attempt at reducing the amount of swarf that ended up on the bench and floor. Files and sandpaper were used to clean up the cut ends. I sanded all surfaces up to P800 grit. The narrow ends and sides were sanded on a sheet of sandpaper held vertically between a thick oak block and the piece of MDF laid on my bench just visible on the right side of Photo 10. After sanding, I drilled the holes and countersinks. Each tab had one countersunk hole and one straight hole—the countersunk hole allowed a flat head screw to fasten the tab to the base and the straight hole accepted a round-head screw used to secure the tab to the case.

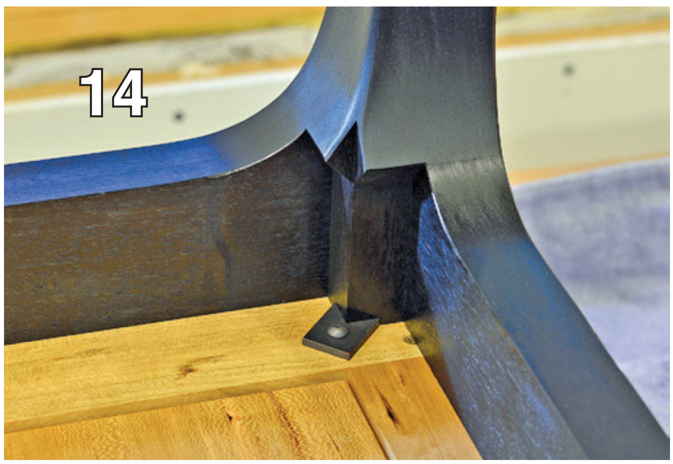
Drilling the holes and countersinks was fairly straightforward. The only issue I encountered was holding the small pieces. Through trial and error I found a hold down system that worked (somewhat visible in Photo 11) but a milling vise for the drill press would have been useful. As far as locating the holes, I relied on stop blocks at the drill press instead of layout on the actual parts. I've seen things online where others have used layout fluid, like Dykem, to "ink" parts, and then marking instruments to scratch layout lines in the inked surfaces. I considered this











route, but it seemed like overkill as the stop blocks made for very consistent drilling.

After drilling and countersinking, I re-sanded each part with P-800 sandpaper just to remove any scratches that might have been picked up while milling. This last pass on sand paper was done as described earlier for the aluminum to make a clean, straight scratch pattern.

I think it was around this point that I decided that the bright brass, while elegant in it's own right, was just too bright. Even though the tabs would be on the underside of the piece, and probably would never be seen, their appearance mattered to me. I had some patination fluid (Novacan Black, purchased from Amazon) left over from when I installed copper gutters on my shop, and decided to do some experimentation to see how it would work on brass. It took some trial and error to figure out how to apply the fluid and I found that swabbing the fluid on with a Q-tip worked best. After allowing the parts to dry for a few minutes, I wiped them down with a clean cloth. This method yielded a very nice, deep chocolate brown patina, which I liked and decided to use on the tabs. Since I didn't know if the chemicals in the patination fluid would react with the solid maple and cherry used to make the case bottom, I used the patination fluid on all surfaces but then sanded the top surface (P800, again) to remove the patina. I also used the patination fluid on the heads of the round-head screws (Photo 12), again applied with a Q-tip.

Each tab had to be let into the base so that the top of the tab was flush with a recess in the base. This allowed the case to sit fully into the recess. I held each tab in place and used a marking knife to scribe the parts, routed the material away and then cleaned up the mortises with chisels. Since each mortise was cut to fit a specific tab, I used letters to indicate which tab belonged at which location on the base (Photo 13).

To fasten the case to the base, I put the case in place, marked the center points of the holes in the tabs and predrilled the screw pilot holes. The holes in the tabs were slightly oversize for the Number 8 screws used, which will allow for some very minor movement of the case relative to the base, should any occur. The placement and orientation of the tabs (Photo 14) was determined by the locations of the stiles, rails and joinery of the case bottom. After seeing the tabs in place and the case attached, it seemed like the decision to add a patina to the brass was a good one—the patinated parts are a bit subtler and blend in nicely.

After these experiences I'm convinced that making my own hardware or other metal items is something I want to keep doing. Perhaps it's the Yankee spirit I picked up while living in New Hampshire, but I definitely prefer making my own versus having to buy something. Frugality is not the only appeal, I also think that making my own hardware provides just that much more satisfaction in doing what I do. ■