

# The Journal

of the Guild of New Hampshire Woodworkers

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## Woodworking in Europe



by Mike Korsak



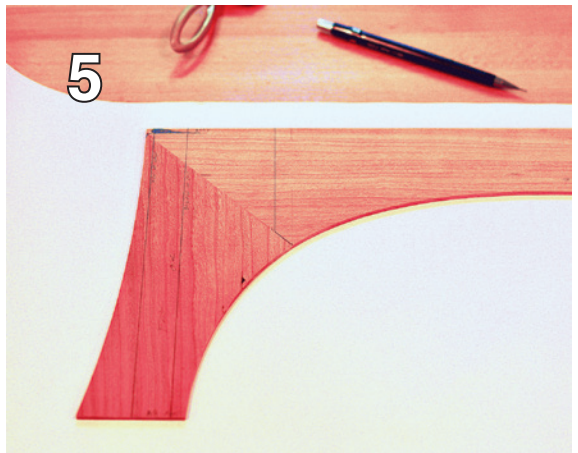
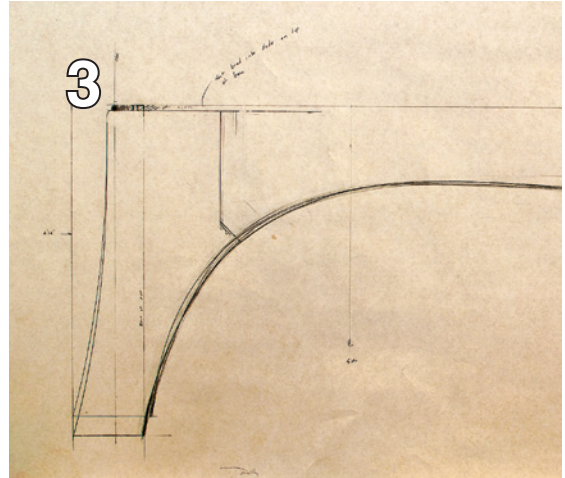
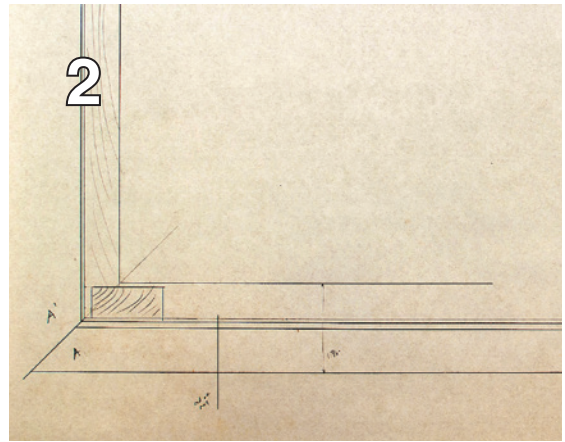
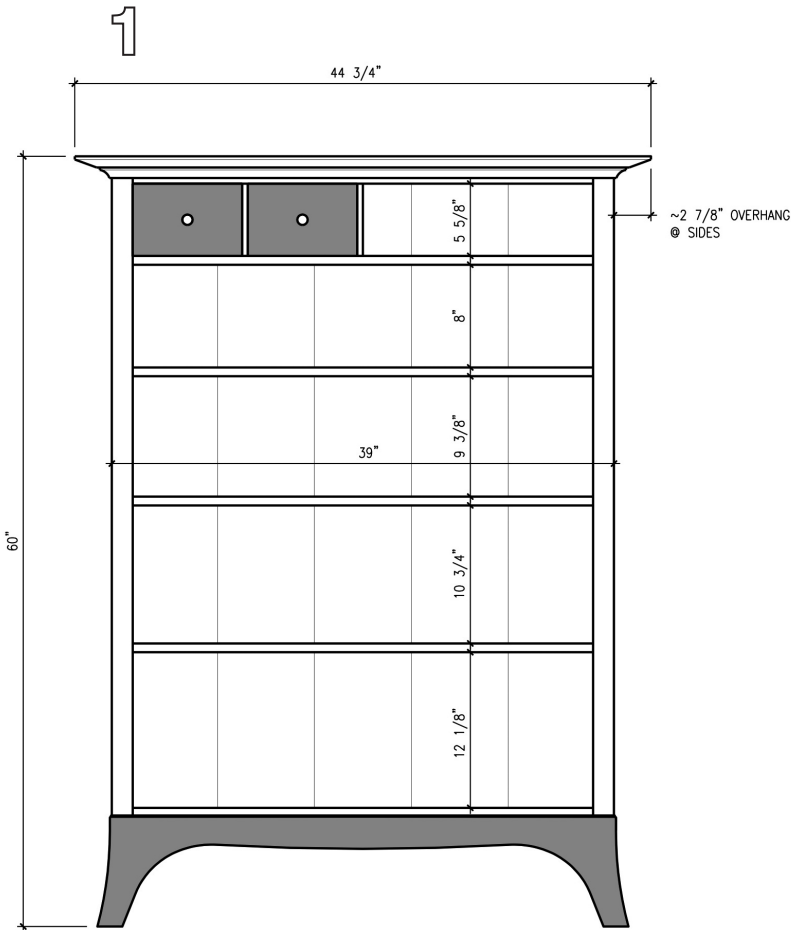
## All About That Base

**E**arly last year I finished the curved-front chest of drawers shown above, made of curly maple with a base made of bubinga. I really liked the base, especially the combination of maple with bubinga, and was excited to have the opportunity to build a commissioned bookcase with the same mix of materials and a base of a similar design. In this article I'll explain how I designed and built the base for the bookcase. Because there are a lot of steps, I've divided it into two articles. In this first article, I'll cover the design of the base, as well as milling and shaping all of the parts in preparation for assembly.

**Design**—The design of the base began at the quoting stage of the project with a CAD drawing (Image 1). At that time, the design of the base was fluid. I knew that I would have to create full-scale drawings to develop the actual layout of the curves when it came time to build the base. To design the base, I began by placing the assembled case on top of a sheet of paper and traced the outline

of the case bottom. It is more efficient to work with the reality of the case rather than trying to transfer measurements and angles. The piece of paper was taped to a piece of  $\frac{1}{4}$ " MDF, and remained taped to the MDF throughout the entire process as it was easily moved around and stored out of the way.

With the footprint of the case traced on paper, I drew additional details, such as the offsets for the base and bead, locations of joinery and any pertinent notes (Photo 2). With the plan view complete, I drew a front elevation of just the base on another sheet of paper (also attached to a piece of  $\frac{1}{4}$ " MDF), transferring the width of case dimension with a story stick. The only dimension I took from the original CAD drawing for the base was the height, which was  $\sim 8\frac{1}{2}$ ". The base had several curves that had to be defined—the outward flare of the feet and the inside sweep of the feet that transitioned up into the swaybacked curve on the bottom of the apron. To define these shapes I began by freehand sketching, just letting my eye and hand work together.



After many iterations I had some sense of the geometry of the curves and moved to bending sticks to better define the curves. At this point I decided I needed to see the base and the case together as there was a disconnect in designing the base by itself, without seeing the relationship of base to case. So I used tracing paper to make a copy of the base drawing, used scissors to cut the drawing out of the tracing paper and taped it to the front bottom of the case, which I had lifted up on blocking to the approximate height of the base. It was very beneficial to see the “base” on the case. I immediately saw that the base was too tall, and needed more work on the inside curve of the foot. To determine a base height that looked good, I played around with the tracing paper base by folding it over a few times to shorten the foot (and lowered the case correspondingly) and found that I liked a base whose height was reduced about  $1\frac{1}{16}$ ”.

Then I moved back to the drawing, repeating the process of fleshing out the curves (Photo 3) through freehand sketching followed by bending sticks. This was a process of purely working by eye; what looked good, flowed well, didn’t seem too heavy or too light. Once I had something that appealed to my eye, I transferred it to tracing paper and again taped the revised tracing paper base to the front bottom of the case. This time it looked right.

**Template**—The next step was to make a template. I used some leftover shop-sawn cherry veneer, about 1/8" thick. I decided to miter the leg to the apron, instead of cutting the entire template out of one piece of veneer, believing that the leg portion of the template would be prone to breaking along the grain. To do this, I laid out the miters, rough cut them on the bandsaw and cleaned them up with a block plane. I glued the leg to the apron with yellow glue, clamped with blue tape.

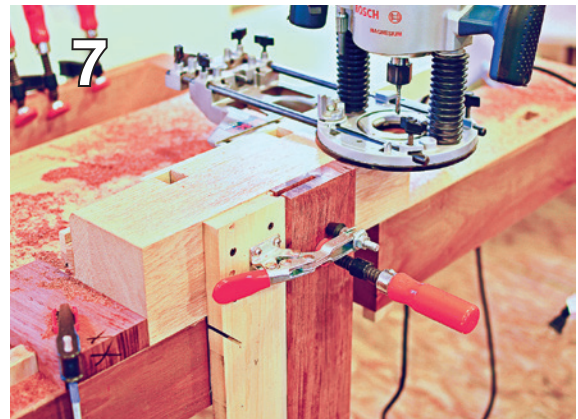
Once the glue had cured, I taped the tracing paper to the template with double-sided tape (Photo 4), bandsawed close to the line, and then cleaned up with a curved sole spokeshave. Once the shape was nicely faired, I laid out some critical references, like the outside edge of the case, the back (inside) face of the foot and the location of the foot to apron joint (Photo 5). For visual reassurance, I used the template as a stand-in for the base, much like I had done with the tracing paper. Photo 6 shows the template sitting at the bottom of the elevated case, with a piece of paper behind the template to hide the blocking. I found that the more I could do to trick my eye into seeing just the base and the case, the better I was able to judge whether the base looked right.

With full-scale drawings and template in hand, I could then finish milling the material to dimension as I was able to take finished dimensions for all of the parts directly from the full scale drawings. I left the height of the aprons a bit oversize, as the waste would be bandsawed away later. The feet were left a bit wide, and I'll explain later why that was helpful.

The feet of the base flare outward, and the outside face of the aprons flare outward to match. My strategy in dealing with the flare was to do as much of the joinery as possible before cutting the curves because it is much easier to hold and machine square parts. I was also very mindful of reference edges. In this case, the reference edges were the back (inside) faces of feet and aprons, the top edges of aprons and the non-mitered vertical edges of the feet. Maintaining those references was essential in cutting consistent joinery.

**Leg Joinery**—With all parts cut to size, the first step was to cut the mortises in the feet and aprons to accept slip tenons. I cut the mortises with an upcut spiral bit in a plunge router. My setup for routing mortises is a squared-up, laminated oak block. Attached to the back of the block is a shaped cleat that captures an auxiliary wood fence attached to a router edge guide. The router base sits on the top of the block, with the fence of the edge guide engaged in the cleat. In this setup, the face of the oak block becomes the reference edge, allowing mortises to be cut in parts with different thicknesses, while still maintaining a consistent reference. Depending on the setup, I can either clamp pieces horizontally to the face of the block, or attach a vertical fence with toggle clamp to the face of the oak block for routing ends of parts as in Photo 7.

With all mortises cut, I referred back to the template to make a second template for the curve on the outside face of the feet. This second template was made with a fence that registered on the back (inside) face of the foot. The outside curve was taken directly from the original template, transferred by carefully running a knife along the edge of the template to cut the curve in a piece of paperboard, which was then sandwiched between two



pieces of plywood to form a double-sided fence. With this second template, I marked the curve on all eight feet (Photo 8).

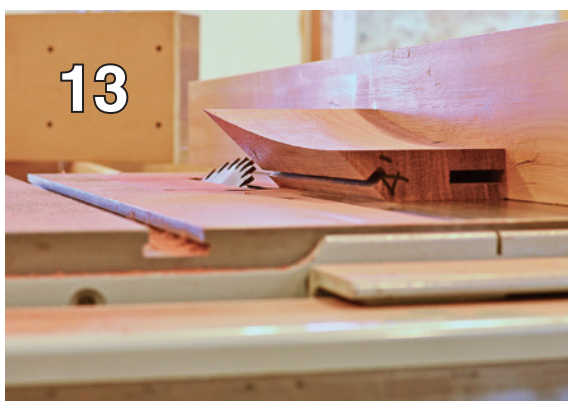
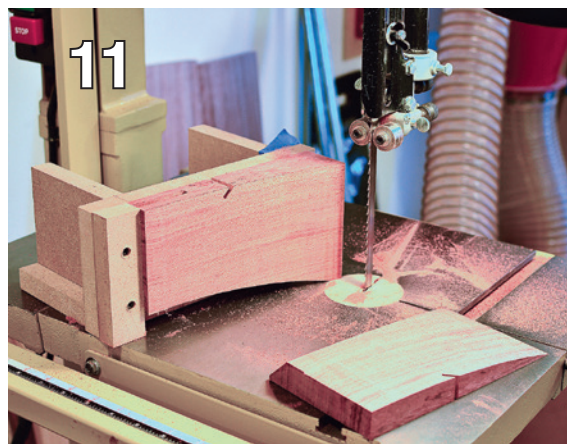
The feet were cut from stock that was not wide enough to allow for full size blanks and therefore the stock was ripped during rough milling at 45° along its length to yield all eight feet. The feet were slightly wider than finished dimension, which allowed me to cut off the tip of the rough miter, leaving a small flat, maybe 1/8" wide (Photo 9). This flat provided a face parallel to the reference edge, and would be helpful later when bandsawing the feet.

I then cut the small miter that is part of the joint between feet and aprons. Starting with careful layout, then test cuts on the tablesaw, I made the cut in the feet with a miter gauge and stop block. The top of the feet referenced against the stop block, and the mortised edge was down on the saw table. This setup is shown in Photo 9.

The next step was to bandsaw the curves in the feet. Since only the small flat would be sitting on the table of the bandsaw, I made a sled to help stabilize the legs during cutting. The sled was made of 3/4" MDF and the feet were attached to the sled (inside reference faces against the sled) with double-sided tape (Photo 10). The offcuts were saved to use later as cauls when assembling the base (Photo 11). The bandsawn faces of the feet were cleaned up with a curved sole spokeshave and scraper. I didn't get too carried away with cleaning up the sawn faces, as I'd have to revisit them after assembly.

The next step was to finish cut the leg miters and spline grooves. Both operations were done on the tablesaw with the blade set at 45°. The miter was cut first, with the fence to the left of the blade (Photo 12). To cut the spline grooves, the fence was moved over to the right side of the blade, keeping the same blade angle, as shown in Photo 13. The spline grooves were cut in two passes as I wanted them to be a bit wider than the thickness of the sawblade. When shifting the fence for the second pass, the blade height was adjusted to keep the bottom of the spline groove from being stepped.

The last step for the legs, before moving on to assembly, was to remove the material above the small miter, which accepts the mitered end of the apron. Photo 14 shows this joint prior to assembly. I removed the material above the miter cut by first removing the bulk of the material on the bandsaw, and then nibbling away the last bit of material in multiple passes on the



tablesaw, with the feet in the same orientation as in Photo 9. Removing the bulk of the material on the bandsaw made the tablesaw operation safer as there were no small pieces to be thrown by the sawblade.

**Aprons**—With the legs complete, I turned to the aprons. First, I cut the corresponding miter on the ends of the aprons using the tablesaw with miter gauge and stop block (Photo 15). As mentioned earlier, the aprons flare outward to match the feet and therefore required some shaping to create the flare. I started by marking the profile of the flare on the ends of the aprons using the paperboard template described earlier.

Then I removed as much material as I dared on the tablesaw, running the aprons through with their top edges down and back (inside) faces against the fence. This left a stepped face (Photo 16), which required some hand work to clean up. I started the cleanup with a rabbet plane, working along the length of the aprons. The narrow iron of the rabbet plane allowed me to work the fairly shallow curve pretty well, but still left a faceted curve.

To fair the curve, I turned to a curved sole spokeshave and worked perpendicular to the grain, sometimes skewed a bit off of perpendicular. This is the same principle as using a jack or scrub plane at an angle to the grain when flattening a wide board. The curved sole of the spokeshave allowed me to work *downhill* on the curve (Photo 17). With the profile marked on the ends of the aprons, I worked down to the line on the ends (Photo 18), and used straightedges to make sure that there was consistency along the length of each apron.

As I worked closer to the line, I would stop and check that the profile on the end of the apron matched the profile on the corresponding foot. Once this relationship was close (just close, because I'd have to flush these joints after assembly), I did a quick cleanup with a scraper whose edge was shaped to match the profile.

At this point, the legs and aprons have been worked as far as they can before assembly. In the next article, I'll describe how I assemble the base, add a decorative bead and attach the completed base to the case, allowing for expansion and contraction of the case. ■

