

Bentwood Leg Table, by Mike Zwolinski

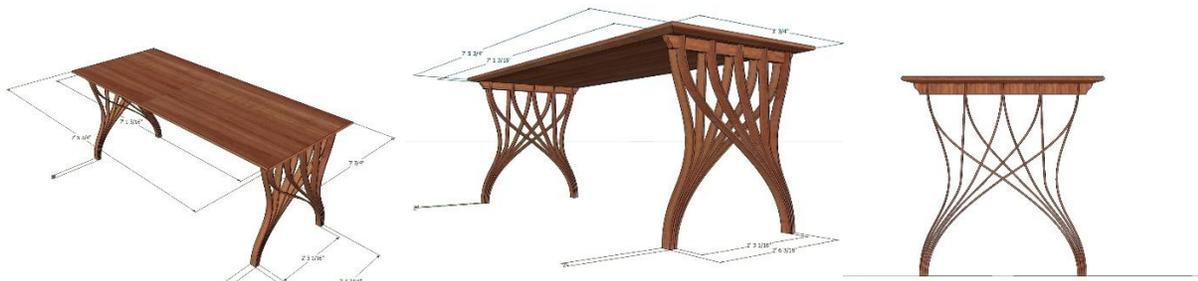


Background

While exhibiting my work last Spring at the ICFE show in NYC's Javits Center, I met an architect from Virginia who had a custom table project in mind. He wanted to have a table built with multiple curved legs (of his design) as a gift for his wife. The table is counter height, and she intends to use it in her art business.

After several months the architect put drawings together of what he was looking for (see below), and we reached an arrangement for me to build this commission. I started the project in September, and completed it in November.

Initial CAD drawings



Approach to Building the Table

I had never worked with curved wood before, but coincidentally I had enrolled in a course to learn more about wood curvature at the Center for Furniture Craftsmanship (www.woodschooll.org) up in Maine. This course started in September, so the timing worked out well with my project.

The course was taught by David Haig, a furniture maker from New Zealand (davidhaig.co.nz). He has a great reputation for building unique chairs (picture below), and he's a world expert in bending wood. In the course we discussed the pros and cons of bending wood versus using bent laminations for my project, and decided laminations would be the right approach given the need to accurately reproduce the same curves for each of the four table legs. The advantage of laminations is that the shapes remain constant after being removed from the form, while steam bent wood typically has either spring back, or spring forward, depending if it was kiln or air dried.



Monogram Rocking Chair by David Haig

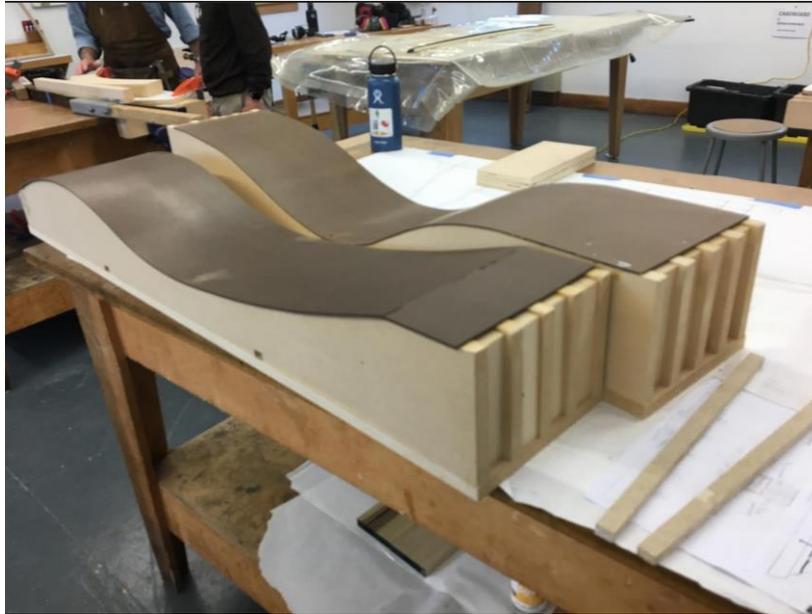
Steps

The steps followed to create the leg components were to build forms, source veneer, glue up the veneer and press it to the molds in a vacuum bag.

Build Forms

Using the CAD drawings printed out full size, I created five forms, one for each of the leg components. To speed up the process of gluing up the laminations, we decided to use wide veneer (>9"), so that I could create all four of each curved piece at the same time, greatly reducing the time waiting for the glue to dry. (This was important as others in the class needed access to the vacuum bags.) Each of the finished pieces were 2" wide, so a 9" wide veneer form allowed four pieces side by side, plus some extra space for saw kerfs when cutting them to the final widths.

Below is a picture of two of the forms, of five in total. They were built from $\frac{3}{4}$ " MDF, with $\frac{1}{8}$ " Masonite on top. As the vacuum bag exerts significant pressure in all directions (100 lbs/sq in I was told), significant internal structure is needed inside the mold so they don't collapse when under vacuum.



Veneer

I found some extra-thick quartersawn cherry veneer that was 12" wide at CertainlyWood.com, which worked out well. "Extra thick" veneer is just $\frac{1}{18}$ " of an inch thick (normal thickness is $\sim\frac{1}{50}$ " today). I needed seven layers of this veneer to achieve the $\frac{3}{8}$ " thickness of the leg pieces.

Glue-up

The glue-up process was tricky, as I had to glue up 7 layers of veneer, each 9" wide and 50" long, and get them into the vacuum bag in less than five minutes, which is the open time when using Titebond 3 glue. After the first one it became pretty routine. Drying time was 12 hours on the mold, in the vacuum bag.

Below is a photo of two of the molds drying in the vacuum bag:



Once the veneer sheets were dry I created a clean edge on them using a jointer, and then sliced them into 2" wide pieces on a band saw, jointing each one as I went. Finally, when all were cut, I taped them together and ran the through a planer edge-wise to ensure they were all exactly the same width.

Photo of one set of leg components, layed out on the CAD drawing:



Creating the Leg Mounts

For the stringers that hold the leg pieces at the tabletop I used cherry pieces that were 2" thick, 3" wide, and 36" long. The top of each curved leg component needed to be inset into this stringer, and a kerf had to be cut into the stringer to match the curve of the top of each leg component. To do this I built a router template that exactly matched the curves (this took three attempts to get it right).

The template itself was created by matching the curve of the 5 leg components on small pieces of MDF, positioning them properly per the CAD drawings, and then creating the template using a 5/8" router bit and a router collar. This resulted in a template with 5/8" wide curves. I then sourced a router bit that was exactly the same thickness of the leg pieces (10mm), and used a 5/8" router collar to follow the template. This allowed me to easily cut the proper kerfs for all five leg components at the same time.

Photo of the Router Template



Leg Assembly

The customer wanted the table stained a particular color. As the wood is cherry, I first had to seal it to ensure I had a consistent color throughout, then apply the stain. On the leg pieces I also had to apply a finish to the wide sides of the leg pieces as access post assembly would be difficult.

The top ends of the leg pieces were first notched, where I removed a portion that was 3/4" wide, then another 3/4" was inset into the router kerfs, leaving 1/2" extending beyond the stringers for viewing. I used epoxy to attach the leg pieces to stringers, as I had a concern due to the pre-finishing that regular wood glue wouldn't be strong enough, even after removing the finish there.

Also, I inserted 3/16" dowels between every intersection of the leg pieces where they crossed other leg pieces, and epoxied each intersection too. The dowels are mounted in holes drilled into the insides of each leg component, so they are not visible outside. I couldn't find a dowel center that was 3/16", so I made one. The legs were very solid when I was done. Once they were glued up I could resume finishing the legs.

Picture of the legs during assembly:



Close-up of intersections of leg components:

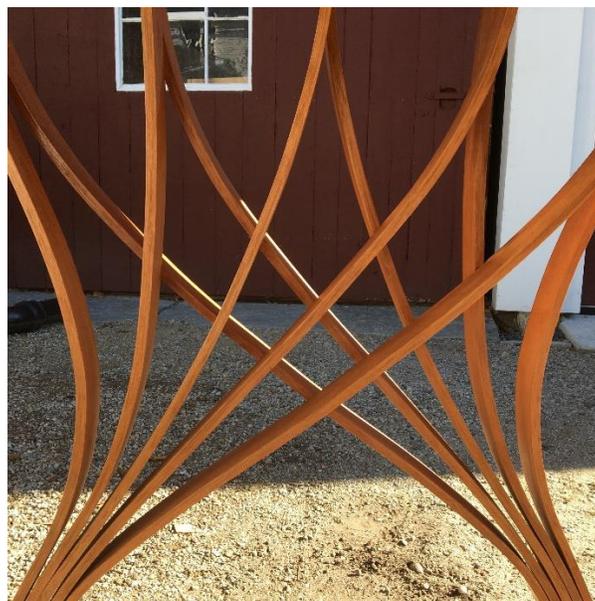


Table Top

The table top, measuring 88” by 36” was made from flatsawn cherry boards glued and “dominoed” together. The edges had a shallow oval bullnose edge, and a 15-degree undercut, which I cut after making a jig for my track saw.

Delivery

The project was completed and delivered to the customer in Virginia Beach in mid-November. I’m currently making a second one as a demo unit to show at tradeshow, and my customer is working on a design of a chair to match the table. We’ll see what he comes up with!

You can see more of my work at www.FletcherHouseFurniture.com