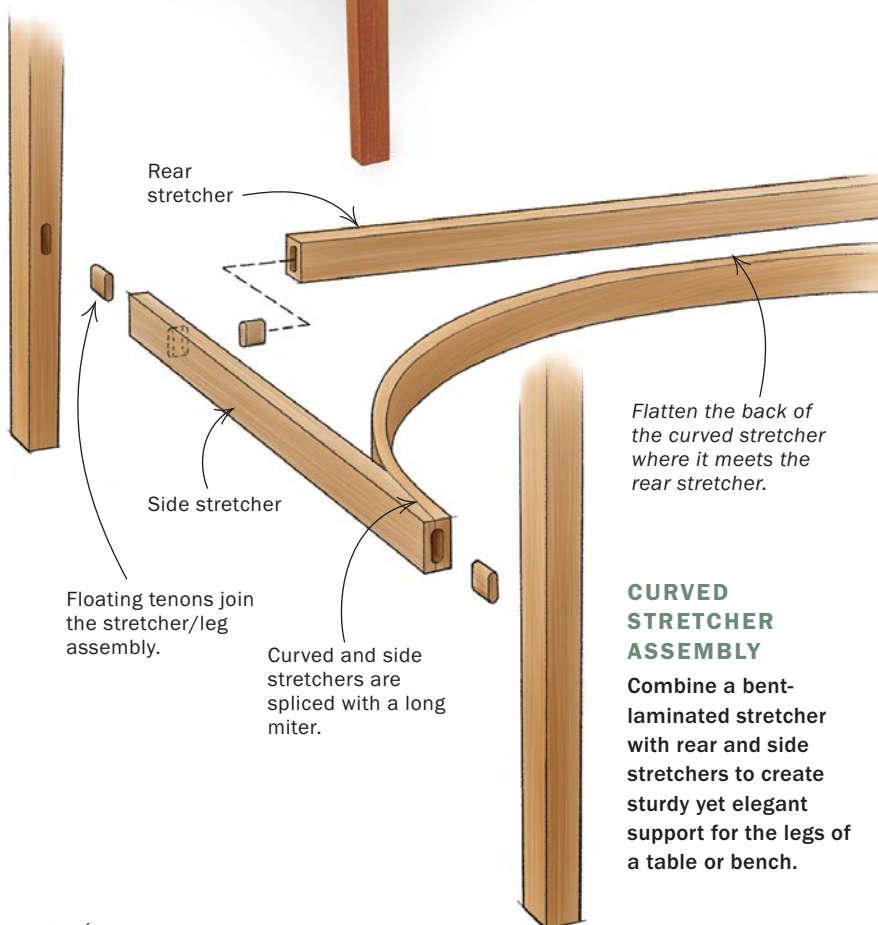


## Curved stretcher adds grace and legroom

BY MARK EDMUNDSON



### CURVED STRETCHER ASSEMBLY

Combine a bent-laminated stretcher with rear and side stretchers to create sturdy yet elegant support for the legs of a table or bench.

The first time I saw bent-laminated stretchers was on furniture made by Edward Barnsley. He used this detail with success on everything from chairs to dining-room tables. I admired the combination of graceful lines and the practical benefit of ample legroom. The bent-laminated stretcher struck me as a detail that would get attention, but in a subtle way. It also looked like it would be a challenge to construct.

When I finally slipped it into a design for a bench, I anticipated some frustration. However, as I built that piece and others like it, I found that the potential for inaccuracy doesn't have to threaten the success of the project. By leaving the stretcher-assembly stock extralong until the last moment, I've found that I can compensate for unforeseen discrepancies.

I highly recommend using full-scale drawings when building a piece with curved parts; you'll consult the plan view constantly for information. On the drawing, lay out the location and shape of the legs first and then the rear and side stretchers. The location of the rear stretcher is a matter of taste, but a couple of inches from the back legs is a good starting point.

The most critical areas are the splice joints between the front ends of the bent lamination and the side stretchers. Also, you must cut a flat face at the center of the lamination, where it attaches to the rear

# Making a curved stretcher

Find a graceful curve that connects the side and rear stretchers, and then make a lamination form. After glue-up, trim the edges and ends of the lamination.



**Lay out the curve on the drawing.** Use a flexible batten to create a curve that gets tighter near its ends. Trace the shape on your drawing to be sure the curve hits the right spots. Use that curve to make a lamination form.

stretcher. Use the full-size drawing to determine the curve of the lamination so that it meets the stretchers and front legs as it should.

The bent lamination needn't be a radius curve. In fact, a curve with tighter corners and a slight flattening in the middle is more graceful and provides more legroom. I lay out only half of the curve and then use a half-template to create a symmetrical, full template. Check the full curve on your drawing, then use it to make the lamination form.

## Glue up the bent lamination

The adhesive I use for bent laminations is Unibond 800, a two-part urea resin available from Vacuum Pressing Systems (800-382-4109; [www.vacupress.com](http://www.vacupress.com)). This glue creates a more rigid glue line and less springback than yellow or white glue. Still, you should make the bent lamination a couple of inches longer than the finished piece to allow adjustments for a slight amount of springback. I've found that  $\frac{3}{32}$  in. is a good thickness for the plies.

After the glue has set, remove the bent lamination from the form and clean up the top and bottom edges. Start on the jointer, and then trim the other edge on the bandsaw. Finish off that bandsawn surface by running it through a thickness planer.

Return to the plan drawing with the curve. Does it still meet the leg in the intended location? If it



**Assemble the lamination.** Start clamping at the middle and work toward the ends, using a clamping caul made from five or six strips of  $\frac{3}{4}$ -in.-thick birch plywood to prevent bumps.



**Trim the ends.** Again, use the drawing as a guide. Mark and trim each end 1 in. extralong at this point. Use a long stick to ensure that the cuts will be aligned.



**Flatten the back for a strong glue joint.** To keep the workpiece stable during the cut, tape or clamp it to a plywood base.

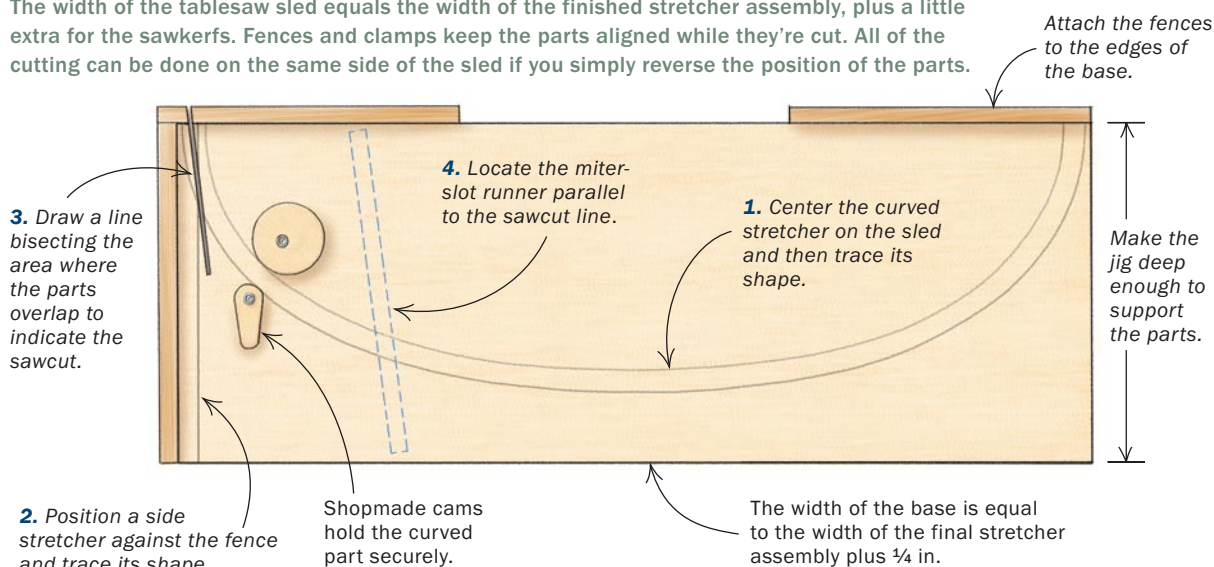


## Use a tablesaw sled to trim the stretchers



**Lay out the sawcut and attach the miter-slot runner.** Place the curved stretcher and side stretcher on the sled and trace their shapes. Use a piece of wood the same thickness as the sawkerf to bisect the area where they intersect, and draw the path of the sawblade (above). Use a bevel gauge to transfer the angle and location of the cut from inside the sled to the front edge. Then use that angle and line (right) to position the sled on a miter-slot runner.

The width of the tablesaw sled equals the width of the finished stretcher assembly, plus a little extra for the sawkerfs. Fences and clamps keep the parts aligned while they're cut. All of the cutting can be done on the same side of the sled if you simply reverse the position of the parts.



has sprung outward more than you expected, don't worry—just move the curve toward the front of the table or bench until it intersects properly with the front leg. Note: This will change the location of the rear stretcher.

### Decide on joinery

Now is the time to decide what type of joinery you plan to use where the stretchers meet the legs—joinery you shouldn't cut until the entire stretcher system has been assembled. I often use floating tenons, especially if the legs are curved or tapered, because it is easier to trim the stretcher ends for a flush fit than it is to saw tenons on all of them and maintain accurate shoulders.

Lay the bent lamination on your drawing to determine where to trim the ends. Leave them about 1 in. extralong at this point; it's good to have some room for small adjustments later. Keep the cuts aligned with each other and square to the overall lamination. Leave the side stretchers extralong, too. Once these sawcuts have been made, you can flatten the center of the lamination where it will join the rear stretcher. Rip the flat by attaching the bent lamination to a simple plywood base, with the front ends riding a long auxiliary fence on the tablesaw.



**Cut the parts one at a time.** Cam-action disks clamp the curved part in place (left); the side stretcher simply is clamped to the fence (right). After cutting one joint, just flip the curved stretcher and repeat the process at the other end.

### Use a tablesaw sled to cut the splice joints

Next are the splice joints between the bent-laminated stretcher and the side stretchers. This is the most involved part of the construction, and the goal is to keep the side stretchers in proper alignment. An elegantly simple tablesaw jig will ensure your



## Glue and trim the assembly



**Return to the drawing and align the parts.** Clamp the parts and drill for alignment pins in the waste areas. Now you can locate the back stretcher precisely. Mark its length and position, then cut its joinery.



**Glue up the whole assembly at once.** Make curved clamp pads for the inside faces of the splice joints. The pins keep the splice joints from slipping.

success. The rectangular plywood sled holds the mating pieces in their plan-view positions while you cut each face of each splice joint.

Use a bevel gauge to record the angle of the cut and also to carry the cut line over the front fence onto the front of the jig. Then use the bevel-gauge setting to angle the jig to the miter slot, and line up the cut mark with the sawblade. Temporarily clamp the jig in place and screw it onto a miter-slot runner underneath. Cut into the jig to check the alignment before cutting the actual joint.

You are just about ready to cut the joint, but you need a means for securing the curved part. Use the lines you traced earlier to locate two opposing cams. The straight side stretcher simply can be clamped to the side fence. Cut the pieces one at a time, then flip the curved stretcher in the jig to cut the same joinery at the other end.

With the front splices finished, check the joints against the drawing. Adjust the alignment of parts to create clean junctions between them and then clamp the parts in place. By leaving them extralong, you have created a waste area at the end of each splice joint. Drill through these areas for a small dowel that will lock each joint in position. Once you lay the rear stretcher against the flat area on the back of the

bent lamination, you can see exactly where the rear stretcher will contact the side stretchers. If necessary, cut the rear stretcher a bit long or short to flex the assembly into alignment during glue-up. Now cut the joinery for the rear stretcher.

### Glue up the whole assembly

Sand the parts before gluing up the stretcher system, as some areas will be hard to reach afterward. Use a slow-setting glue.

After glue-up, place the assembly on the plan-view drawing to mark the ends for trimming. To cut the ends, clamp the entire assembly to a tablesaw crosscutting sled (see the left photo below). Then reference the front ends to cut the back ends of the side stretchers.

With the stretcher system done, all that's left is to join it to the legs. For floating tenons, use a router and a template guide (below right). For sawn tenons, cut them by hand or make a tablesaw sled that can hold the entire assembly in the necessary positions.

The key to building this stretcher system is heading off potential mistakes. By using a full-scale plan and leaving pieces extralong until the last moment, you will be able to corral any wild outcomes to acceptable boundaries. □



**Trim the assembly to final size.** Lay the stretcher assembly on the drawing to mark the final length of the front ends, and cut them with a crosscutting sled on the tablesaw. Then measure from the front ends to mark and cut the back ends.



**Router jig for floating-tenon joinery.** To cut a precise mortise in one end of the finished assembly, make a jig to secure the workpiece and act as a router template.