

Build a Bow-Arm Morris Chair



Lamination
puts beautiful grain
and a graceful curve
within arm's reach

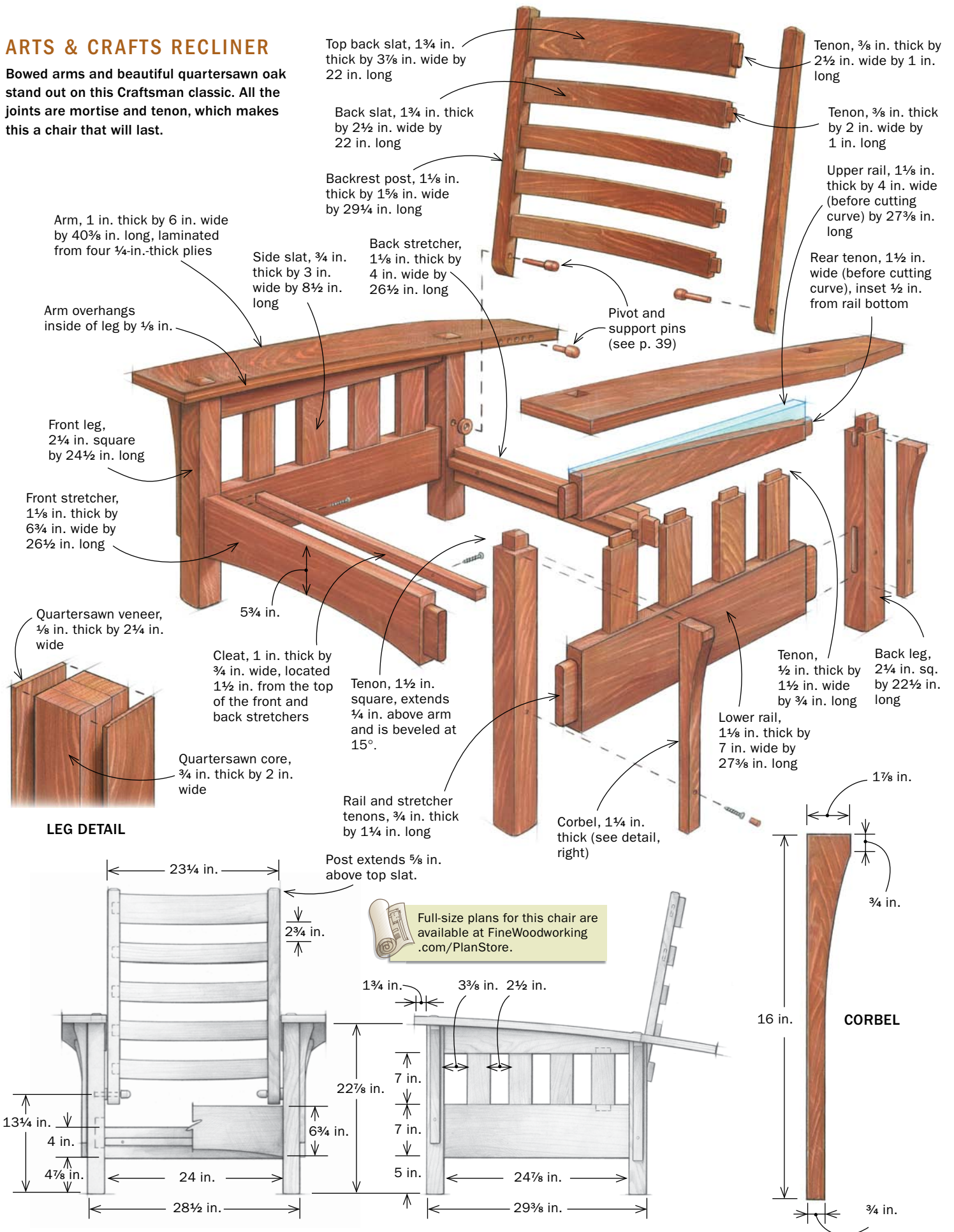
BY GREGORY PAOLINI

Craftsman furniture is known for its straight lines, quartersawn oak, and sense of earthen mass and solidity. No piece displays those features better than a Morris chair, with its large, square legs and wide arms decked out in beautiful ray-fleck figure. The gracefully bowed arms of this version, designed by Brian Murphy of American Furniture Design and related to a design by Gustav Stickley, lighten the mass just enough to give it the feel of irresistible comfort. Throw in a reclining back and firm, but giving, cushions, and you have a chair that you'll never want to leave.

For the most part, the construction is straightforward. But the most distinctive part of the chair—its arms—presents two big challenges: making bowed arms with attractive grain, and cutting a mortise-and-tenon joint on the curved arms and side frame. I'll show you how laminating the arms gets you around those challenges. And I'll show you how to

ARTS & CRAFTS RECLINER

Bowed arms and beautiful quartersawn oak stand out on this Craftsman classic. All the joints are mortise and tenon, which makes this a chair that will last.



TIPS FOR ACCURATE JOINTS

Every joint in this chair is a mortise and tenon, the traditional Craftsman joint. They must fit well to get a square and strong chair. Here's how to cut the joints accurately with two common tools: a router and a tablesaw.



Start with the right bit. When routing mortises, Paolini matches the straight bit's diameter to the mortise's width so he doesn't have to move the router side to side and risk tilting it out of square. Two fences (one the router's edge guide; the other clamped on) keep the router on track.



get striking quartersawn grain everywhere it counts, including a simple and authentic method for making a leg with four quartersawn faces.

Legs that look good from every angle

The legs of a traditional Morris chair have four quartersawn faces. Lumber like that doesn't grow on trees, but it can be made in the shop. There are several different methods to achieve the look, but the one Stickley used, which is the easiest by far, is to glue up a core of quartersawn lumber and then laminate two quartersawn veneers over the flatsawn edges of the core.

After the glue is dry, trim the veneers flush to the core with a router and flush-trimming bit. Then crosscut the bottom of each leg to square it up. Don't worry about the tops right now.

Mortises, then tenons

When making a mortise-and-tenon joint, I usually start with the mortises. It's much easier to fit a tenon to a mortise than the other way around. You can cut all of the mortises now, except the four in the arms. They're laid out and cut after you make the

tenons on the tops of the legs.

Remain consistent with your reference edges. When cutting the mortises on the legs, for example, reference the same fence against the outside face of each one. Otherwise, the position of the mortises will vary, resulting in sloppy joints and possibly a chair that's out of square.

Now cut all of the tenons, except those on top of the legs, at the tablesaw. Cut a full tenon on the back of the upper rail; you'll just saw away part of it later.

Router-cut mortises have round ends, so I round the tenons with the rasp portion of a Nicholson 4-in-hand file. Its smooth edges



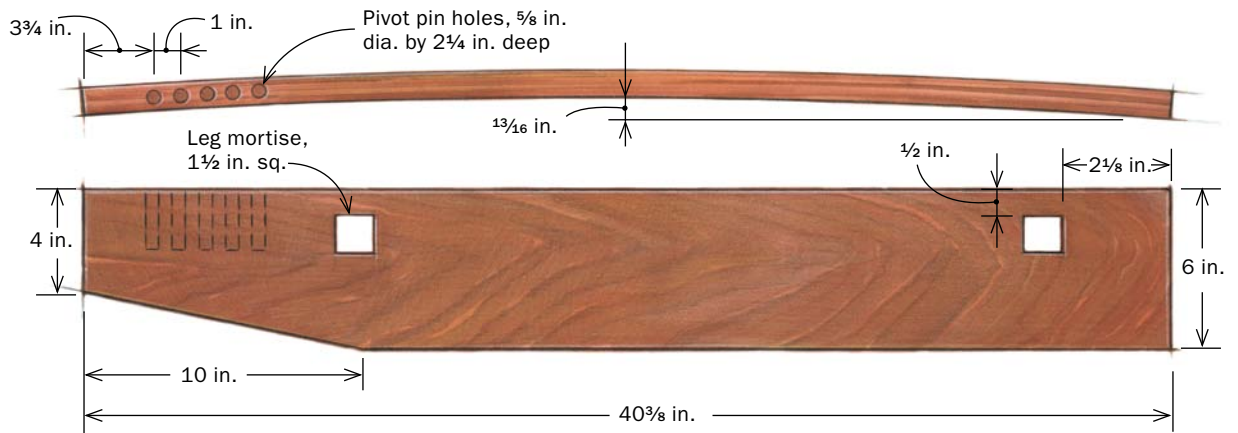
Double the parts for stable routing. Thin pieces, like the side posts, don't provide a stable surface for a router. Clamp two or three of them together to get a wider bearing surface.



Tenons at the tablesaw. First, cut the shoulders a hair deeper than the cheeks using a combination blade. Then, use a dado set to cut the cheeks. Support the piece with the miter gauge.

HOW TO LAMINATE THE ARMS

The bow of the arms needs to match the curve cut onto the upper rails and legs. Use a full-scale drawing of the arm's profile to make the bending form and you'll get a great fit.



Resaw the plies. Start the cuts on the table saw and use the kerfs to guide the bandsaw blade as you finish the cut freehand.



Build the form layer by layer. Make the first layer at the bandsaw, cleaning it up with sandpaper. Glue and screw on each successive layer and rout it flush.



Finish the form. Screw a melamine fence to the rear of the form and a stop to its front edge. Packing tape keeps the glue from sticking to the form and stop.

won't mar the tenon shoulders, and its aggressive teeth make quick work of the rounding.

The tenons on the lower side rails will interfere with those of the front and back stretchers where they meet inside the legs. The best way around this is to insert the side rails into their mortises and trace the front and back mortises onto them. You'll need to trim the tenons' thickness about $\frac{1}{8}$ in. in those areas.

Drawing brings arms and legs together

The upper rail and the tops of the legs must be curved to match the bow of the arms. The easiest way to do this is to make a full-size drawing of the arm's profile. You'll use this drawing to make a pattern for marking the curve on the upper rails and legs and to make the bending form used to laminate the arms. Here's an easy



Clamps, clamps, clamps. After coating the plies with glue, press them against the stop and fence. Add a flexible caul on top and start clamping next to the stop. Work progressively down along the form. Place a clamp every 2 in. You'll need two dozen.



Mark the curve. With the sides dry-fitted, align the bottom of the rail pattern with the bottom of the rail and mark the curve on the legs. This locates the tenon's shoulders on the legs. Then disassemble the sides, realign the pattern on the rail, and mark its curve.

way to make the full-size drawing of the profile. Spring a batten between two nails located at both ends of the arc. Push the center of the batten up to the high point of the arc and trace the line.

To make the pattern for marking the curve on the legs and upper rail, use graphite paper to transfer the arm's profile (see drawing, p. 35) to a piece of MDF. Cut the curve on the bandsaw and use files and sandpaper to smooth it.

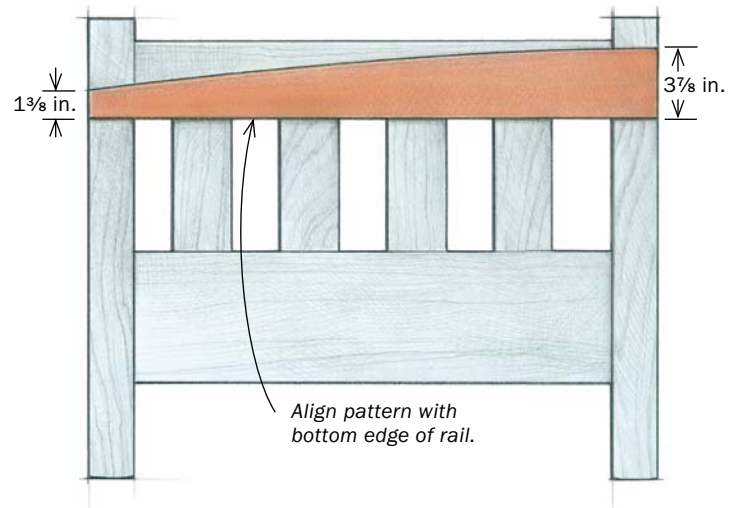
Laminated arms are a cut above

Because the bowed arms are so prominent in this design, the figure and grain that shows on the top of each arm must be just right. Arms sawn from solid lumber would have a wild, distracting grain pattern. But laminating the arms allows you to control their look, choosing your best stock for the top and orienting it for the best effect. A laminated arm is also more stable than one cut from solid lumber, and concerns about short grain weakness disappear.

Laminating form keeps plies in line—Bent laminations can be tricky, but they don't need to be. A fence and a stop on the form keep the plies aligned, and a simple caul applies even pressure over them. Using the right kind of glue will prevent the plies from

SAME PATTERN FOR THE SIDES

The hardest part of building this chair is fitting the arms to the sides. The tops of the upper rails are curved, and so are the tenon shoulders. Make a pattern of the upper rails and use it to mark the curve. It's easier to align and hold in place than one of the arms.



Cut the tenons. Start by cutting the shoulders square. Cut the cheeks with a dado set. Then chop and pare away the waste with a chisel as shown to define the curved shoulders.

creeping after you remove them from the form. Start by making a laminating form. First, transfer the arm's profile to a piece of 3/4-in.-thick MDF. The pattern for marking the curve won't work here, because the arms are longer than it.

Cut close to the line of the curve on a bandsaw and sand or file down to the line. You need eight 3/4-in. layers to get a form 6 in. wide. Use the first layer to make the remaining seven.

Screw a fence to the side of the form and a stop to its front end. They will keep the plies aligned as you glue up the arms. Cover all of the working surfaces with packing tape to prevent glue from sticking to them.



VIDEO WORKSHOP

Watch Paolini build this project from start to finish in a members-only video at FineWoodworking.com/extras.

MORTISE THE ARMS

The most accurate way to locate the arm mortises is to mark directly from the leg tenons. That way, you're not guessing where they should be.



First, cut arms to size. After scraping the glue from one edge and jointing it, rip the arm to width with the concave side up. Crosscut the arms to length, using a sled and small shim to get a square cut.

Low-stress resawing—It takes a finely tuned bandsaw to resaw wide lumber. To make things easier, I begin resawing at the tablesaw and finish up at the bandsaw. The tablesaw removes most of the material and its kerfs help me guide the bandsaw blade through the arm. After resawing all of my laminates to $\frac{5}{16}$ in. thick, I plane them to $\frac{1}{4}$ in.

The right glue for laminations—The best glue for laminating curved parts is urea formaldehyde. It has a long open time and doesn't creep once dry. Those benefits outweigh its longer drying time. It is, however, a known carcinogen, so wear gloves and use a respirator or work in a well-ventilated area.

I use a piece of whiteboard for a caul, because it bends well and is glue-resistant. Available at home centers, whiteboard is $\frac{1}{8}$ -in.-thick Masonite covered on one side with white thermofoil.

Once both arms are laminated, scrape the glue from one edge, joint it, and rip the arm to width on the tablesaw, concave side up. Then cut the arm to length using a crosscut sled and a shim to get a square cut on the end.

Curved arms mean curved sides

To mark the curve of the arm on the upper rails and legs, dry-fit the side assemblies together. Align the bottom of the pattern with the bottoms of the rails. The ends of the pattern will align with the outside edges of the front and rear legs. Mark the curve on the inside and outside faces of the legs. And mark the inside of the legs on the pattern so you can realign it to mark the rail. Disassemble the side, and mark the curve there, too.

Cut the curve on the upper rail on the bandsaw. When you do this, the back tenon will be cut down to its final width. To cut the tenons on the legs, first use a combination blade to cut all four shoulders square to the leg, in line with the highest shoulder (the one of the front of each leg). Then use a dado set to cut the



1



2



3

LOCATE AND CUT THE MORTISES

1. Lay the side assembly on your bench and stand an arm on the tenons, flush against their shoulders. The front mortise is $2\frac{3}{8}$ in. from the front edge. Use that measurement to align the arm before transferring the tenon locations to the arm. Lay out the underside, too.

2. Now clamp the arm in a vise so the mortise area is level and use a Forstner bit to remove the waste. To avoid tearout, go halfway from one side, flip the arm, and complete the cut from the other side.

3. Use a chisel to chop away the remaining waste and square the corners. As you did when drilling, go halfway from one side and finish up from the other.

ASSEMBLE THE BASE

Glue up the base before making the back, so you can take measurements for the back directly from it.

Work in stages. Assemble the sides first (right). The slats don't need glue if they fit snugly. Glue the rails to the legs and leave the clamps on overnight. Next, glue up and clamp the stretchers. Attach the arms (below), brushing glue on them and on the leg tenons. Leave the clamps on for 24 hours.



Over and under. After stapling four courses of webbing across the frame's opening, weave webbing through them to create a strong but comfortable base for a cushion.

cheeks. To cut down to the curved shoulder lines on the sides and back of the leg, use a chisel and mallet. I back-bevel the shoulders to ensure a tight fit with the bottom of the armrests.

Through-tenons require careful layout—Dry-fit and clamp the side assemblies in preparation for cutting and fitting the arm mortises. Then clamp an assembly on the bench, inside face down with the tenons overhanging the edge. Set the arms on the tenons and press them snug against the shoulders. Mark the fronts and backs of the mortises directly from the tenons. Remove the arms and mark the mortise sides. Use a Forstner bit to remove most of the waste from the mortises, then pare down to the lines with a chisel. Next, chamfer the tenons that come through the arms. Cut them $\frac{3}{8}$ in. proud of the arms and bevel them at 15° .

After the arms are fit and the tenons chamfered, lay out and drill the holes for the back support pins. A drill press will ensure that they're perpendicular. Be sure to bore the holes before cutting the outside back corner of the arm.

While you're at the drill press, drill the holes for the pivot pins in the legs.

Shape corbels to fit the arms

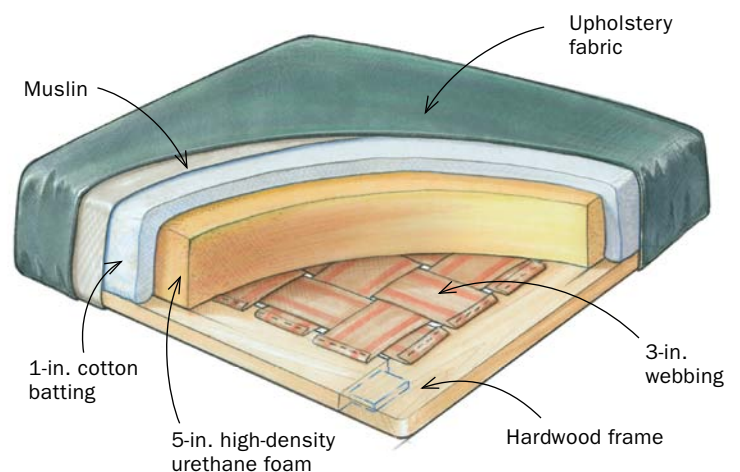
With the arms temporarily in place, you can fit and attach the corbels. I make a pattern for the corbels, mark out four, and cut them out at the bandsaw.

The front and back corbels are the same length, but they hang down lower on the rear legs because of the arm's curve. The corbels are centered on the legs, and their tops need some shaping for a snug fit against the bottom of the arm. After they're shaped, predrill them and the legs for screws, and use a Forstner bit to create a countersink for the screw head. Put a bit of glue on the corbels and screw them in place. Plug the countersinks with shopmade tapered plugs to get a good grain match.

Next, cut the arc on the front stretcher, and screw the seat-frame cleats to it and the back stretcher. Then glue up the base.

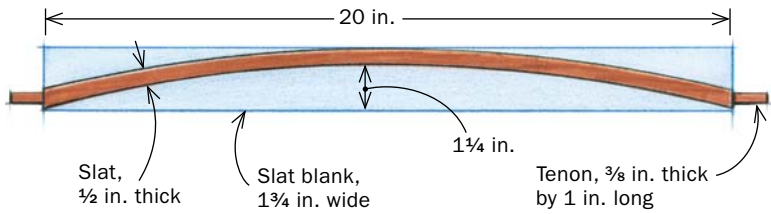
CUSHION ANATOMY

Ask your upholsterer to make a layered cushion like this one. It's firm and durable yet comfortable.



■ THEN MAKE THE BACK

Cut the tenons before shaping the slats. Using a half-pattern to mark the curve of the slats will ensure that they're symmetrical.



Cut the slats. Bandsaw and smooth the curves after cutting the tenons. Because the slats are curved, they tend to flex a little under clamping pressure. Hardwood spacers limit the force of the clamps.

After the glue dried, I made a hardwood frame with webbing for the seat cushion because I sent this chair to an upholsterer, and a hardwood frame is better than the plywood frame some upholsterers use. I used ash to make the frame, joining the parts with mortise-and-tenon joints. The length and depth of the frame should be 1/4 in. undersize to allow room for upholstery to be wrapped around the sides and stapled to the bottom.

Back slats: Tenon the curve

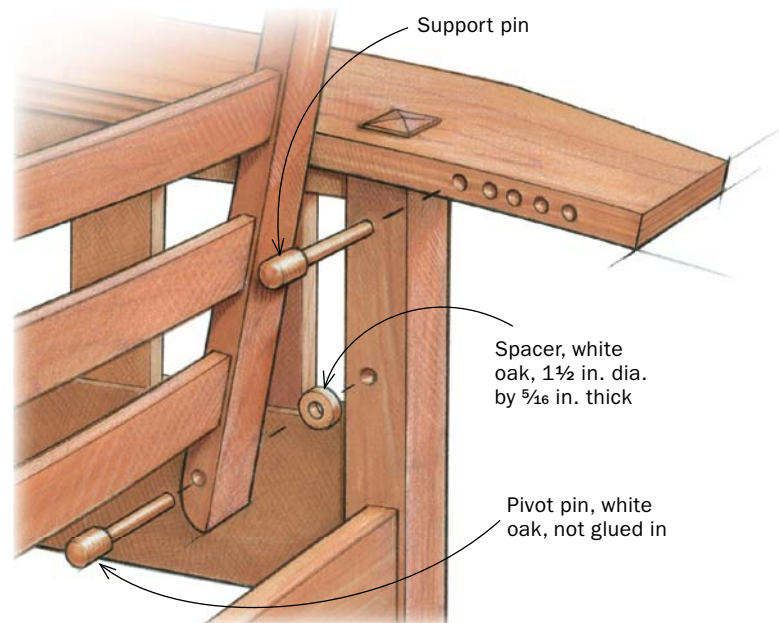
I cut the tenons on the back slats at the same time as the other tenons because it is much easier to cut tenons on a square piece than on a thin, curved piece. Use a pattern to lay out the curve and then cut it at the bandsaw. I cleaned up the sawmarks with a stationary belt sander, but a spokeshave or sanding blocks also works.

Authentic look without the fumes

Stickley's furniture is well-known for its rich brown finish, which can be had by fuming with industrial ammonia. But you can forgo the ammonia and still get a great finish. After sanding this chair, I applied an antique cherry aniline dye. I let it dry overnight and then applied a dark walnut oil-based pigment stain. I finished it off with Minwax Polycrylic water-based polyurethane.

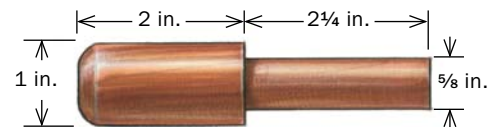
When the finish is dry and the upholstery done, bring your chair into the house, put it in a welcoming spot, and take a moment to enjoy its grace and beauty. Then take a seat—and maybe a nap—to enjoy its comfort. □

Gregory Paolini makes Arts and Crafts style furniture in Waynesville, N.C.

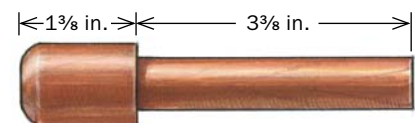


PIVOT AND SUPPORT PINS

Even a novice can turn these pins. Check the diameter of the shaft with a 5/8-in. open-end wrench. Use a gouge until you're close, and finish up with sandpaper.



SUPPORT PIN



PIVOT PIN

Online Extra
For the complete finishing recipe, go to FineWoodworking.com/extras.