

Windsor Rocker

Take an elegant rocker
off your bucket list

BY PETER GALBERT

I've been a professional woodworker for 20 years, but for the last 10, I've produced Windsor chairs exclusively, because they are comfortable, durable, beautiful, and fun to make. Rocking chairs are the most popular because they fit a unique niche in modern lives. The human body just isn't meant to sit in one position for long periods. The easy motion of a rocking chair helps keep blood moving and allows the sitter to shift positions easily while relaxing different muscle groups. I think of it as a subtle exercise machine.

Designing this version of a Windsor rocker, I was inspired by Sam Maloof's chairs to extend the sculptural quality of the seat to the arms, crest, and spindles. For me, this strengthens the visual unity of the chair, and the fluid lines invite the sitter to relax. I've also updated some traditional techniques to make this project more accessible to new chairmakers. You'll get plenty of opportunity to use hand tools, but don't worry about having to buy lots of Windsor-chairmaking tools: While specialized tools may speed the process, you can use general shop tools for most tasks.

The turnings are all elementary and only require a lathe with at least 18 in. between centers.

In this first of a two-part series, I'll cover steam-bending the parts, shaping the seat, and attaching the legs. In *FWW* #219, I'll complete the top half, add the rockers, and apply a wipe-on finish.

Windsor chairs traditionally had pine seats, as pine is easily carved, while the rest of the chair was made from a wood such as oak or ash that was strong or steam-bent well. The mismatch in appearance disappeared when the chair was painted. Because this chair will be clear-coated, I chose to make

WINDSOR MEETS MALOOF



Please touch. The tapered tops of the back posts invite a bystander to feel them.



Sculpted for the hand. The curvy arms have hand-tool marks underneath for the sitter to discover.



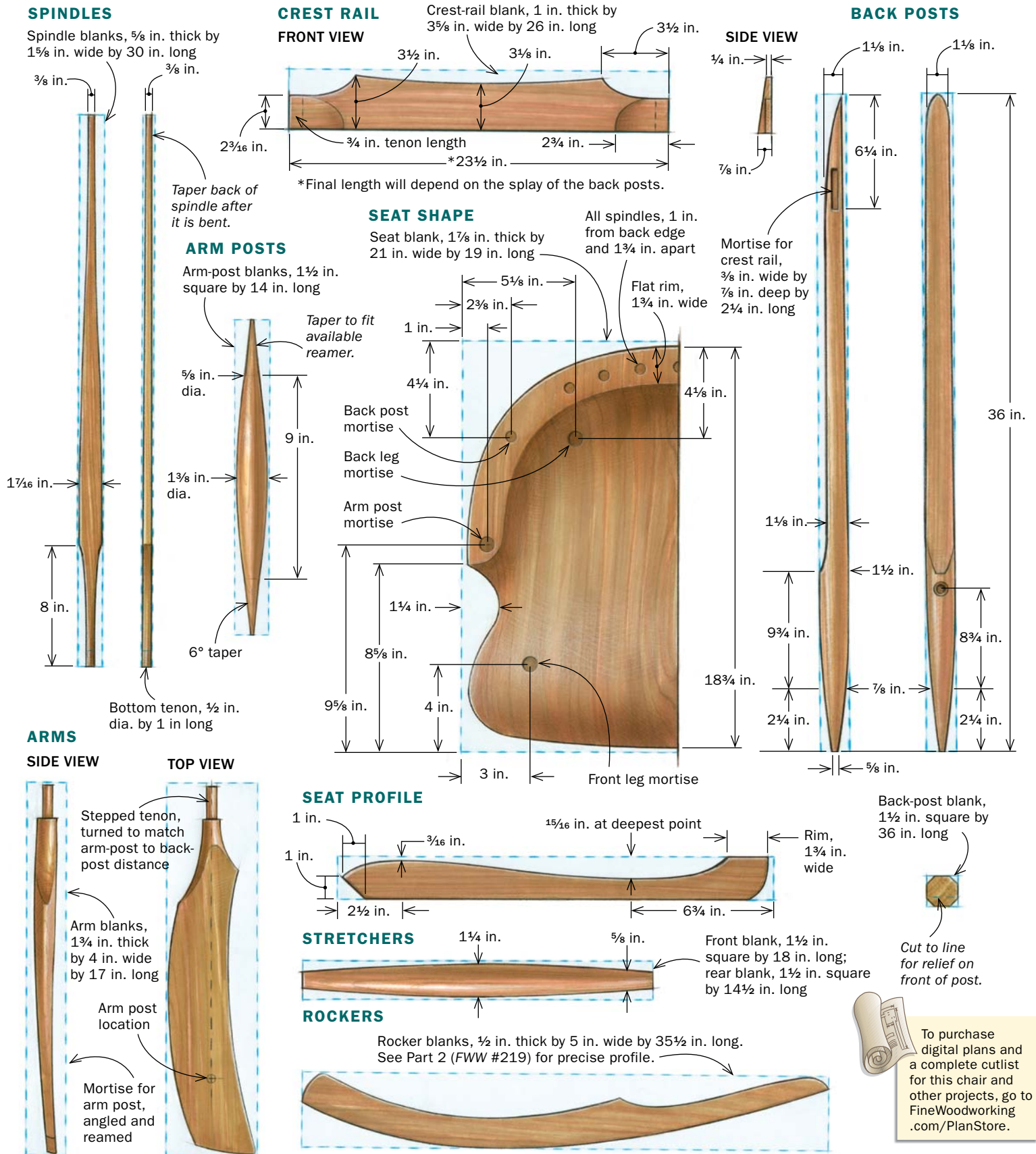
Anchored in tradition. Traditional Windsor joinery includes tapered leg tenons that are wedged and glued.



Ready to rock. The quarter-sawn rockers not only look good but are balanced to the chair.

Without Special Tools

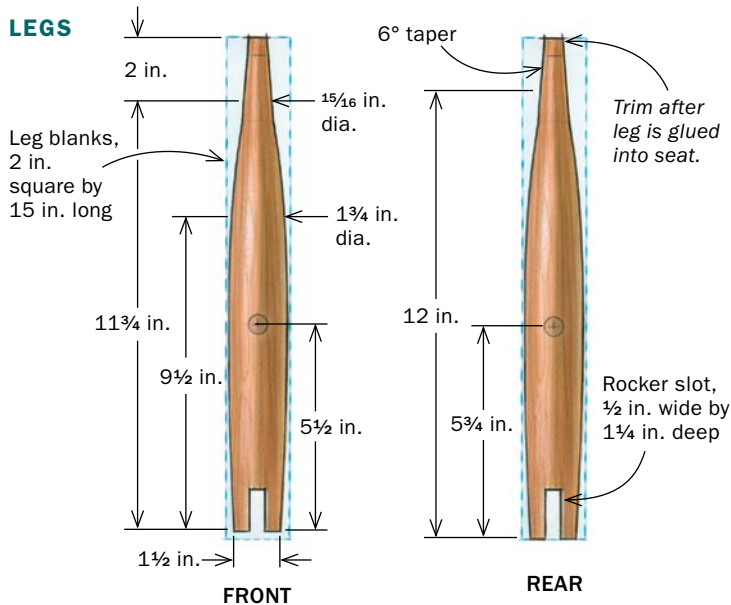
Part 1



To purchase digital plans and a complete cutlist for this chair and other projects, go to FineWoodworking.com/PlanStore.

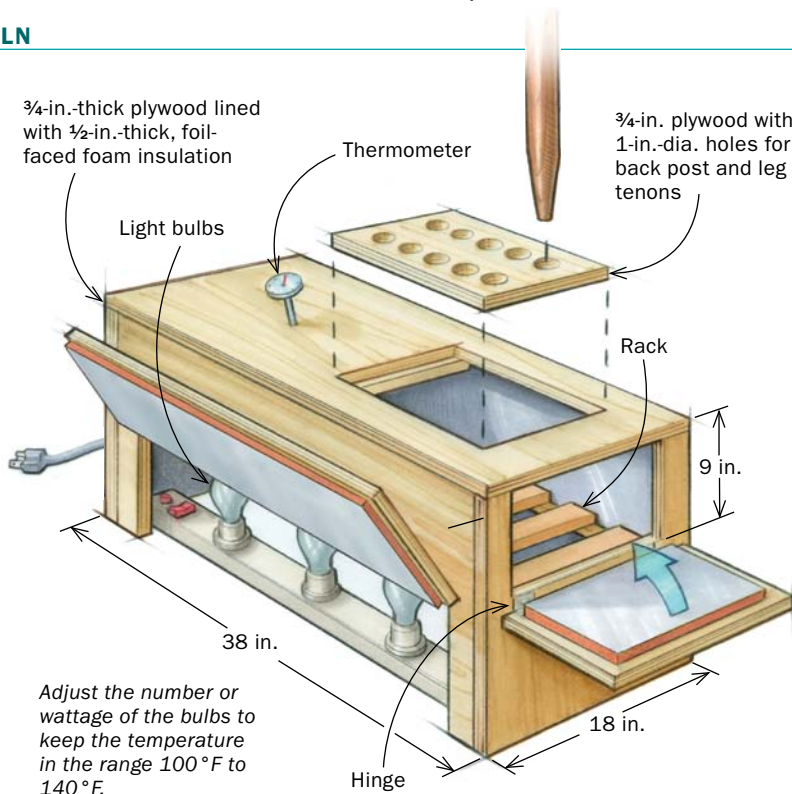
Super-dry the tenons

Rough-turn the legs. Because the tenon needs to be super-dried, turn the whole leg oversize by roughly $\frac{1}{8}$ in. at first.



SHOPMADE DRYING KILN

The legs and back posts only need to have their tenons dried, but the drying chamber needs to be long enough and tall enough to hold the spindles and crest rail later. Place the tenon end of each leg in the kiln. After a few days, the tenon's moisture content will be between 4% and 5%.



it from white oak with a butternut seat because these two woods take on a similar shade when fumed with ammonia.

For most chairs, I prefer green wood for the bent parts, but this chair can be made successfully using air-dried or even kiln-dried oak and butternut. The bends are gentle enough that the risk of breaking during bending is low.

Select boards that are as straight-grained as possible whether the parts are to be bent or not. Not only is the fiber alignment important for strength, but it also makes shaving the surface of the wood more predictable. To obtain parts with dead-straight grain, rip the board along its grain lines on the bandsaw.

All the white-oak parts, except for the rockers, can be cut from an 8/4 board that is approximately 10 in. wide by 120 in. long or the equivalent square feet. The rockers are cut from 4/4 stock, preferably quartersawn to display the ray fleck.

Wet-dry joints are tried and true

On the mortise-and-tenon joints (excluding the spindles and the crest rail), I use a variation of the wet-dry joint: The tenon is super-dried in a simple kiln (heated to 100°F–140°F with light bulbs) and then inserted in a mortise with a higher moisture content. As the moisture equalizes, the tenon swells and the mortise shrinks, creating a locked joint.

Start by cutting out the blanks for all the parts except the rockers and the seat. Rough-turn the legs, stretchers, and arm posts slightly oversize, and place them in the kiln until fully dry, which takes about five days for air-dried wood. Then finish-turn them, making sure the tenons taper at exactly 6° and match the length in the plans. Keep them in the kiln until ready to be assembled or, if your work on the chair is intermittent, place them back in the kiln a couple of days before you will use them. Cut the back posts to octagons on the tablesaw before rough-turning the tenon. If your lathe can't handle the length, you can shape the tenon using a drawknife and a spokeshave.

Steam-bending made simple

I steam-bend the back posts, spindles, and crest rail in a simple plywood box hooked up to a wallpaper steamer. Greenwood parts only need about 40 minutes, but kiln-dried wood takes about an hour. Leave the



Dry and tight. Once the tenons are super-dry, you can turn the legs to their final profile. To taper the tenons at exactly 6°, draw the angle on a piece of magnetic sheeting and attach this to the lathe's bed under the tenon.

Bending

Two forms for each steam-bent part



Steam the back posts. After roughly shaping the back posts, place them in the steam box. Leave the super-dried tenons sticking out, but stuff an old T-shirt around them to prevent the steam from escaping.

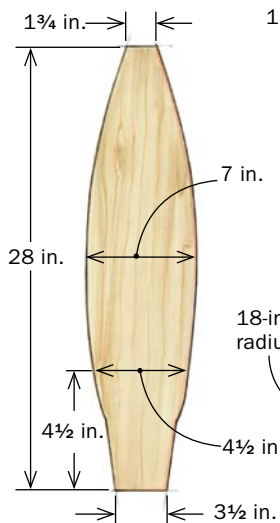


Overbend them. After removing the posts from the steamer, clamp them overnight in a form that deliberately overbends them.

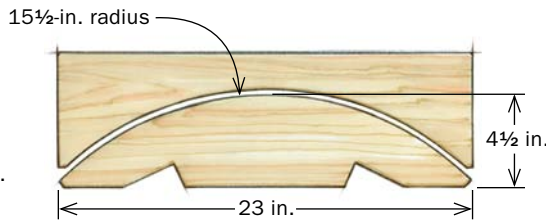


The final form. Transfer the posts to a setting form that opens up the curve slightly and reduces the chances of springback.

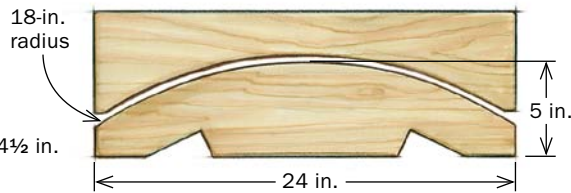
BACK-POST OVERBEND FORM



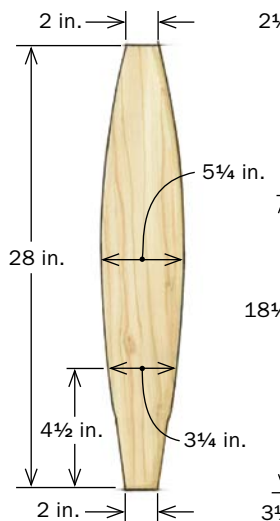
CREST OVERBEND FORM



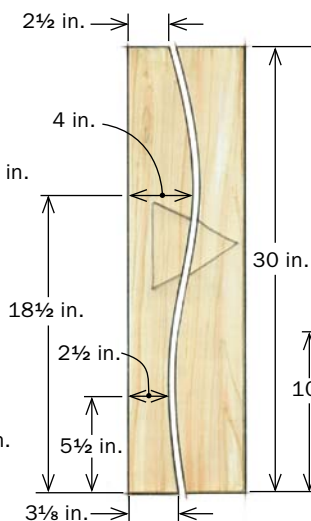
CREST FINAL BEND FORM



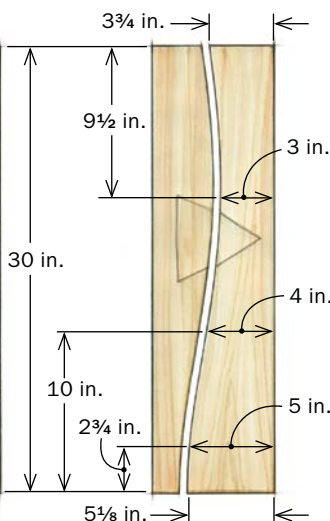
BACK POST FINAL BEND FORM



SPINDLE OVERBEND FORM

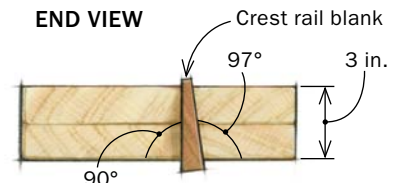


SPINDLE FINAL BEND FORM



Curving the crest rail. Both the overbend and the setting form for the crest rail have one face cut at 97° to accommodate the rail's tapered profile.

END VIEW



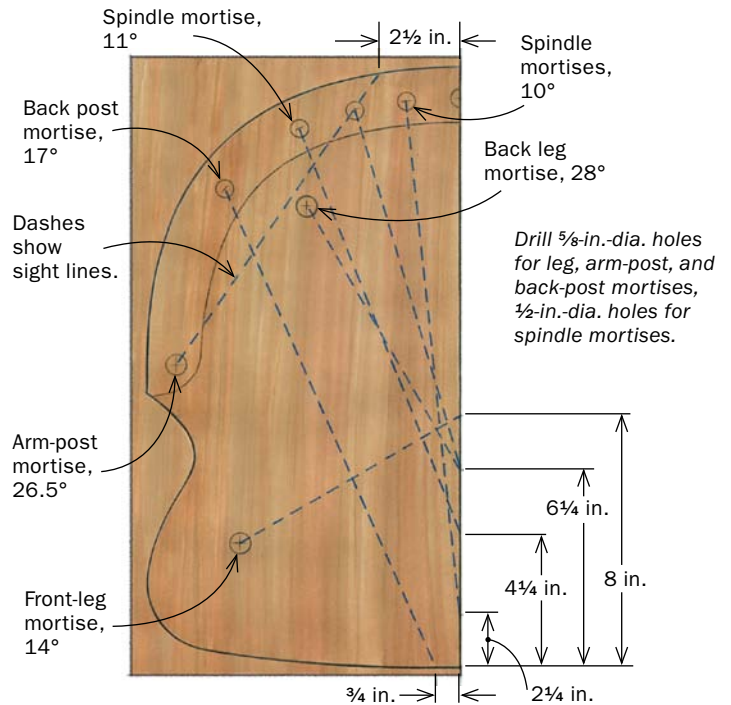
Simple form for the spindles. Like all the other forms, the ones for the spindles are made from 2x6 or 2x8 lumber.



Drill the seat

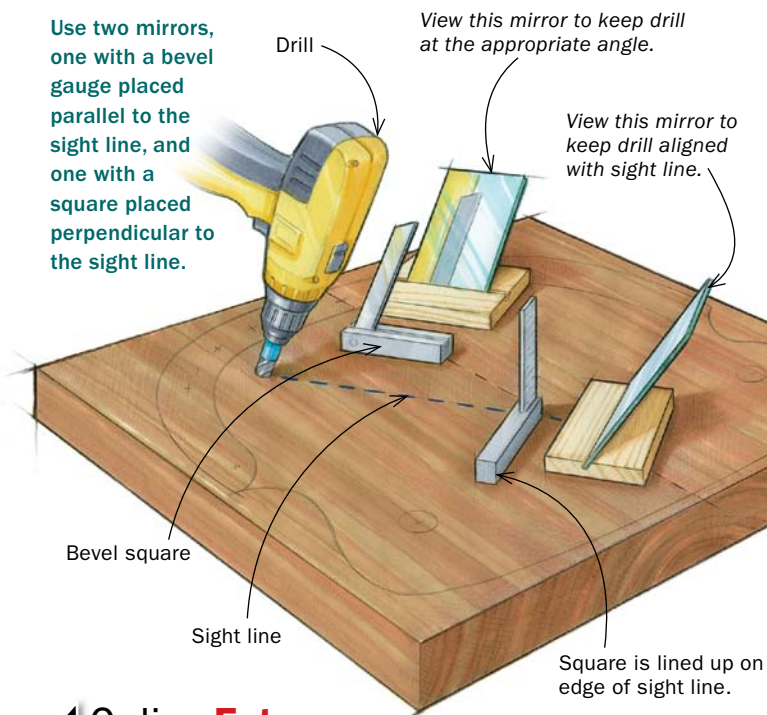
ANGLES AND SIGHT LINES

For each angle, the drill is tilted along the sight lines. The drill is angled toward the center of the seat for the leg mortises and away for the back posts, arm posts, and spindles. All holes are drilled from the top of the seat.



The mirror trick. By correctly positioning two mirrors, Galbert can dart his eyes from one to the other to check that he is drilling at the correct angle.

Use two mirrors, one with a bevel gauge placed parallel to the sight line, and one with a square placed perpendicular to the sight line.



Online Extra

To watch Peter Galbert drill and ream an angled mortise, go to FineWoodworking.com/extras.

back posts and crest rail in their overbend forms overnight (the spindles only need 10 minutes), and then clamp them in their final forms to open up the curve a bit.

Leave the crest rail in the final form for a few days before placing it in the kiln for a couple of days. For the spindles, I use a jig that acts like a press, capturing the spindles front and back to ensure even pressure. Don't dent the moist, softened wood.

Drill the holes before shaping the seat

The seat is the chair's anchor both visually and structurally. The arm posts, back posts, and legs have tapered tenons that lock into the seat at various angles. Accurately drilling and reaming the tapered, angled holes is essential.

Drill all the holes from the top of the seat, but transfer the sightlines to the underside and use them to ream in the tapers for the leg tenons. On rocking chairs, proper leg alignment simplifies mounting and balancing the rockers. Put the leg in position and place the bevel gauge next to it and parallel to the sight line.

Use the reamer to adjust the angle of the hole if necessary.

The position of the back posts greatly affects the final look and feel of the chair. Draw a line perpendicular to the sight line on the seat, place the post in the hole, and align the flat on the front of the top with this line. By lining up a square on the sight line with a mark on the center of the top of the post, you can tell if the post needs to move left or right (splay) as you ream.

To get the proper tilt back (rake) on the post, connect a string to a spot on the front of the post at the height of the arm mortise and to the top center of the post. The rake is correct when this

TAPER THE MORTISES FOR THE LEGS, ARM POSTS, AND BACK POSTS

REAMER REFINES THE HOLE

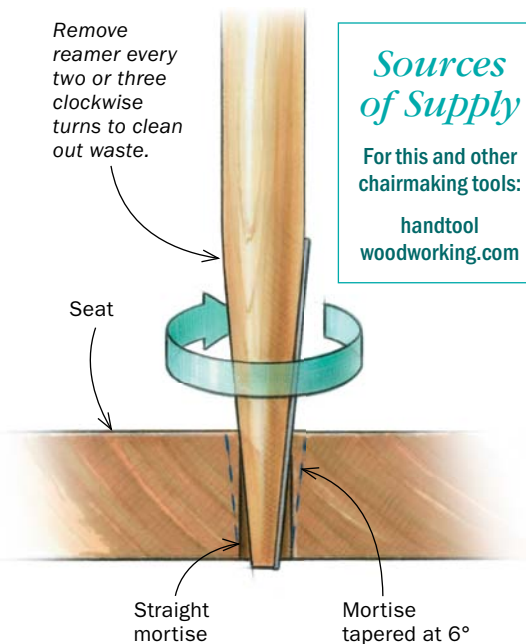
The reamer is one chairmaking tool you do need. It creates a 6° taper to match the turned tenons, and also allows you to fine-tune the hole's angle.

Remove reamer every two or three clockwise turns to clean out waste.

Sources of Supply

For this and other chairmaking tools:

handtool
woodworking.com



Highlighted lines. Blue tape along the edge of the sight lines and at the top of the bevel gauge helps you align the top of the reamer in both planes simultaneously while you turn it.



Check your progress. After every few turns of the reamer, insert the leg to see that it is angled correctly. Stop reaming once the leg has reached the correct depth.

string is at 100° tilted back along the sight line and parallel to the string on the other back post (see photos, right).

Given the potential for slight variations in the bends, it is wise to practice by drawing the rear portion of the pattern on a 2x8, drilling and reaming in the back posts to check their alignment. Once you've done this, measure the exact rake and splay of the mortise using a straight dummy post. Now use the new numbers and the dummy post to start the actual mortises in the right direction.

Many tools aid shaping the seat—Carving a seat reminds me of why I became a woodworker. Watching the shapes emerge while the shavings fly is pure joy. Transfer the pattern onto the blank, drill two holes to locate the deepest part of the seat, and then start excavating down to this level. Create a rough bowl shape at the back of the seat, then carve a ramp from the bowl to the front of the seat, forming a shovel shape. Come back to refine and smooth the area that you carved away, making sure that you stay just inside the line that demarcates the flat area around the back of the seat.

Next, round over the front of the seat, removing enough material so the seat doesn't cut off circulation behind the knees. Shape the underside of the front and create a curved bevel on the underside of the sides. A drawknife is the fastest tool for this, and with practice you can take fine shavings and get into tight corners. Or, use flat and curved-sole spokeshaves, rasps, files, and scrapers. I find that power carvers and sanders soften the sculptural qualities of the seat. Last, bandsaw the back of the seat and carve a convex profile.

Stretchers and rockers brace the legs

Now that the seat is carved, turn to the undercarriage. Dry-fit the legs, mark each one where it enters the seat, and measure



String trick. It is hard to align the curved back posts with the bevel gauge when setting their rake angle. Tie a piece of string from the top of each post to the location of the mortise for the arm and then compare the angle of the string to the gauge.

Shaping the seat is fun

You can use dedicated chairmaking tools or regular woodworking tools—or a combination of the two—to sculpt the seat.



Hollowing is a process. An adze (at left, background) is the traditional tool for creating the seat's recess, but a wide carving gouge and a mallet also get the job done. An inshave (inset, foreground) is the tool of choice for refining the surface. A curved cabinet scraper works too, but takes longer.



Profile the front edge. The top side is gently rounded, and the bottom is beveled. With a slight change in the cutting angle, a drawknife can either hog off wood quickly or make fine finishing cuts (left). The beveled S-shaped curves on the sides of the seat can be shaped with a drawknife, a spokeshave, rasps (above), files, and scrapers.



Bandsaw the back. Once you've finished shaping the top and front of the seat, there is less need for a flat clamping surface, so bandsaw the back curve and then round that edge under.

its length from this point. Now cut them to length on the lathe to get perfectly square ends. Place the legs in their mortises and turn them so that the growth rings seen on the ends of the legs are parallel to the front and back of the seat, as this reduces the effect of seasonal movement on the joint.

This design uses only cross-stretchers because the rockers act as front-to-back stretchers. Mark the height of the stretcher mortises on the adjacent faces of each pair of legs. The exact radial location isn't important, because you can twist the legs in their mortises. Attach some white masking tape to the front face of the front legs and the back face of the back ones. Using a board with one end cut at 85°, draw a line on each piece of tape. Now clamp a leg in a V-shaped holder that mounts in a bench vise. Using a straightedge and a mirror, align the leg until the line on the tape is parallel to the top of the bench. On its angled end, stand the same board you used to draw the line on the tape and use it as an angled drilling guide. In this way, the stretchers will be perfectly parallel to the floor. Drill the mortises 1½ in. deep with a ⅝-in.-dia. brad-point bit.

Place the legs back in the chair, measure for the stretcher lengths, and finish-turn the oversize stretchers that have been super-drying in the kiln. Turn the stretcher tenons until they just fit the mortises. These joints should be so tight that they can only be dry-fit to about one third of the depth. Glue the front and rear assemblies together, being careful to ensure that the legs are in the same plane when you drive in the second leg with a dead-blow mallet.

I use liquid hide glue (oldbrownglue.com) for all the joints on this chair. Not only is it repairable without having to disassemble the whole chair, but it also remains slippery when assembling a joint instead of grabbing like yellow glue. With the latter, you run

How to line up the stretchers



Mark the splay. Set the legs at their final depth (inset) and then cut each one to length on the lathe. To help align the bit when drilling the mortise, use an angled board to draw a line 5° from vertical on each leg.

the risk of not being able to drive a tight joint all the way home. Don't glue these pairs of legs into the seat until after you rout the rocker slots.

Align the rocker slots precisely

Tap the leg assemblies in the seat and make a mark 1¼ in. down on the part of the leg that faces its corresponding leg (left front to left rear, and right front to right rear). This marks the approximate depth of the rocker slot. You want the rockers to continue in the same plane as the legs. Place a rubber band around a pair of legs covering the point you just marked, thread some thin string under each rubber band, draw the ends of the string tight, and allow the rubber bands to snap back. In this way the string will locate the closest points between the two legs. Lay a straightedge over the ends of the legs parallel to the string and make a mark on the ends of the legs. This gives an end point so you can connect the two points to get your vertical axis. Use the straightedge to connect the points on the ends of the legs and extend the line across the end of the legs to give you a horizontal axis.

To cut the rocker slots, make a couple of simple jigs: First, use a router with a fence and a ½-in.-dia. spiral upcut bit to rout a slot about 4 in. long and about 5 in. from the edge of a piece of plywood or MDF. Drill a hole slightly larger than the diameter of the leg in the center of the slot. Clamp the plywood to a workbench so that the slot is parallel to and in the middle of an opened vise.

For the second jig, take a 15-in.-long piece of 3-in. square softwood (a 4x4 works well) and turn it into a cylinder with a slightly



Mortise the leg. Clamp the leg into a V-notched jig held in a bench vise. Pivot the jig until the line on the leg is parallel with the benchtop. Now use mirrors to align the drill bit with the same angled board and drill the mortise in the locations marked earlier.



A tight fit. Once the stretchers are glued in, you'll have to pry the legs apart to fit them into the seat.



Cut the rocker slots and glue up the base

Another string trick. Place rubber bands around each leg 1¼ in. from the ends. Snap a thread between the bands to find the closest points between legs. Then use a straightedge to eyeball and mark the router slots.

smaller diameter at both ends. It will look rather like a rolling pin. Rip the cylinder down the middle on the bandsaw, and then cut a V-shaped notch in the middle of each half. Attach cork floor tile to the two faces of each notch and place a rubber band around each “handle” of the jig.

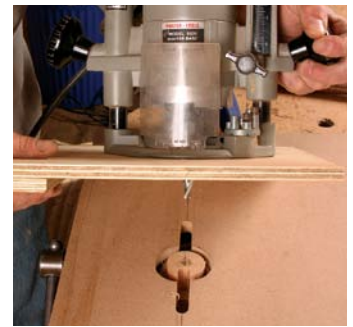
Remove the pairs of legs from the seat and place one of the legs in the notch of the jig. With the rubber bands holding the jig around the leg, place the jig in the vise and adjust it until the vertical axis of the leg is parallel to the front of the bench and the end of the leg is just below the surface of the first jig. Shift the plywood jig so that the slot is parallel to and centered over the axis drawn on the end of the leg. Finally, use the router to cut the slot for the rocker (see photos, above right).

You'll add the rockers last. The rest of the chair needs to be assembled in order to get the right balance. You can, however, now glue the two leg assemblies into the seat. Many of the mortise-and-tenon joints on this chair are reinforced with wedges. These are about 1¼ in. long and taper at a 3° or 4° angle down from ½ in. thick. Use a thin-kerf saw to cut a slot parallel to the stretcher for the wedge in the tenon of each leg. I pre-fume the wedges and pegs with ammonia in a small plastic container until they are almost black to give contrast. Glue in the legs, followed immediately by the wedges. After the glue has dried, cut away the bulk of the protruding tenons, and then bring them flush to the seat with a gouge. You'll now have what resembles a wide and rather low stool. Before assembling the top half of the chair, use a scraper and sandpaper to finish smoothing the seat. Tune in next time (*FWW* #219) to complete this classic. □

Peter Galbert makes Windsor chairs in upstate New York.



Align the slot. Place each leg in a V-notch jig so the layout line is parallel to the front of the bench.



Route the slots. Put a support panel over the leg and run a fence-guided router against it. Enter from both ends to avoid tearout.



Glue in the legs. Unlike yellow glue which can bind prematurely, liquid hide glue remains slippery while the joints are brought together. Be sure to cut a sawkerf in each leg tenon (for wedging) before assembling the base.



Finish the job. With the legs glued and wedged into the seat, cut away most of the protruding tenons and then bring them flush with the seat using a gouge.

