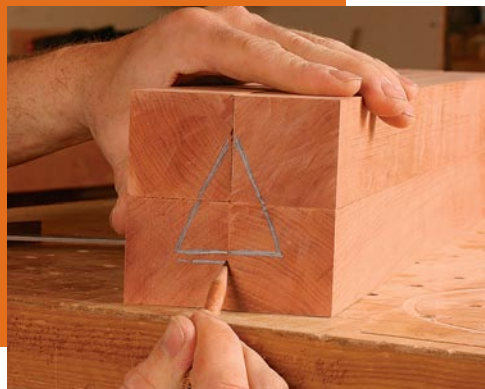


A Modern Bench

Straightforward
joints,
graceful curves,
and a woven
cord seat

BY MARK
EDMUNDSON

SHAPE THE LEGS



Lay out the legs. A cabinetmaker's triangle marked on the ends of the leg blanks helps keep them oriented properly (above). A template (right) not only gives you a pattern for the two curved faces on the legs, but it can also hold all the information you need to mark mortise locations on the leg blanks.

This bench has been part of my entire woodworking career. I designed it as a student in the College of the Redwoods fine woodworking program. A chair by famed Swedish furniture designer Carl Malmsten inspired the shape of the armrests and legs; the Danish-cord seat adds texture. Over the years I've made a half-dozen benches like this one, and used the Danish-cord weave on many pieces.

The bench is a good project for mastering mortise-and-tenon joinery, for working with gently curved components, and, of course, for making a woven seat. You can get all the parts from one 8¼ plank that's 7 in. to 8 in. wide and 8 ft. to 10 ft. long. In a pinch you can use a secondary wood or sapwood for the seat rails because the Danish cord hides the wood completely.

Cut the legs, armrests, and lower side rails from the outside edges, where you'll have straight quartersawn grain. It's a good idea to have enough stock for an extra leg blank. Take the long seat-support rails from the middle of the plank.

Legs are square where it matters

Using the drawing on p. 68 as a guide, make templates for the leg, the curved rails, and the armrests. It's imperative that you know which legs go left, right, front, and back, because of the way they're curved. Label them clearly.

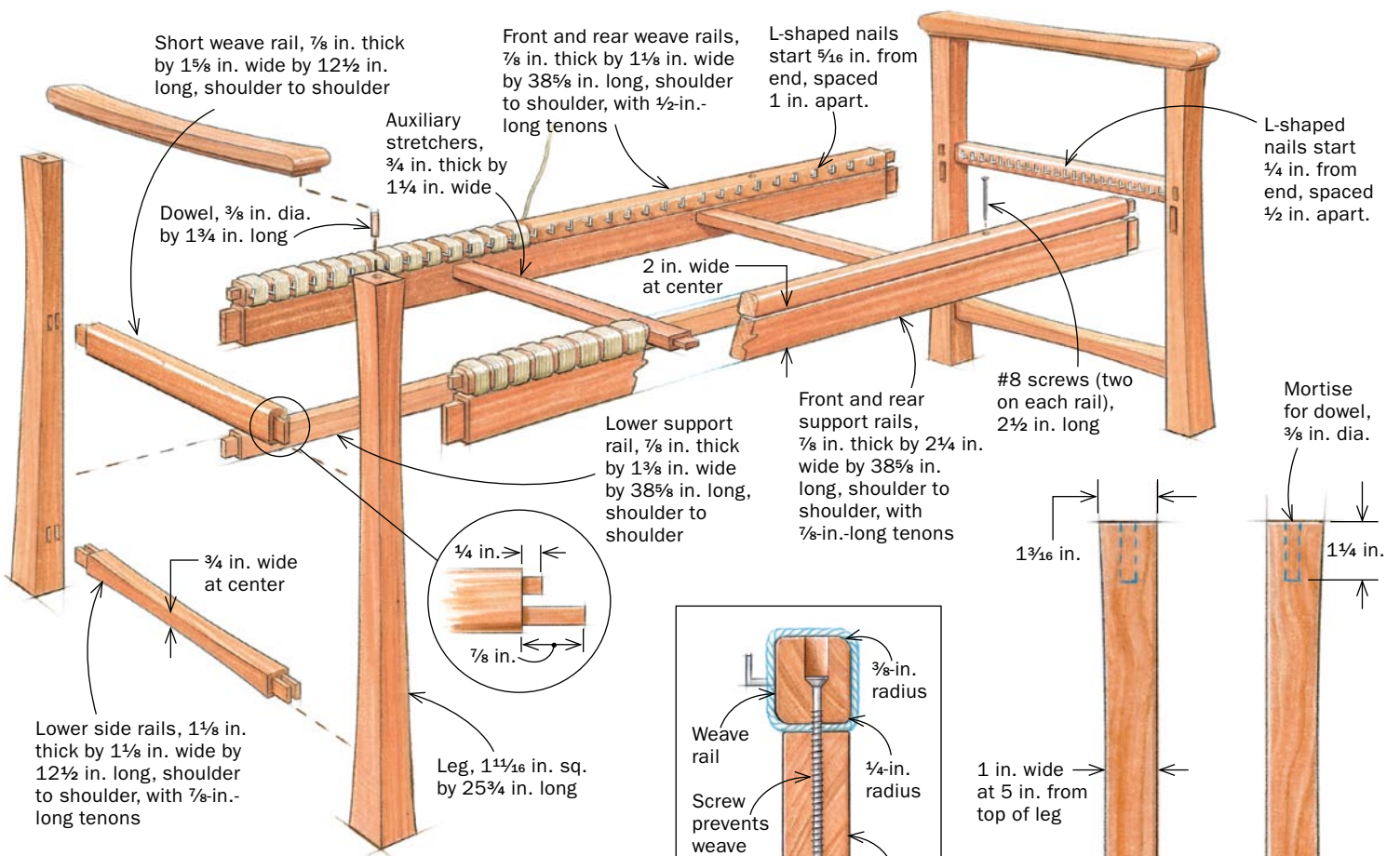
Mark the leg template with the locations of the top and bottom of each mortise. Transfer the mortise locations to the leg



Cut the mortises. If you use a plunge router with an adjustable edge guide, you can easily dial in the depth of the different mortises and their distances from the edge of the blank. Stop blocks clamped to the blank control the length of the mortises. After routing, use a chisel to square up the ends of the mortises.

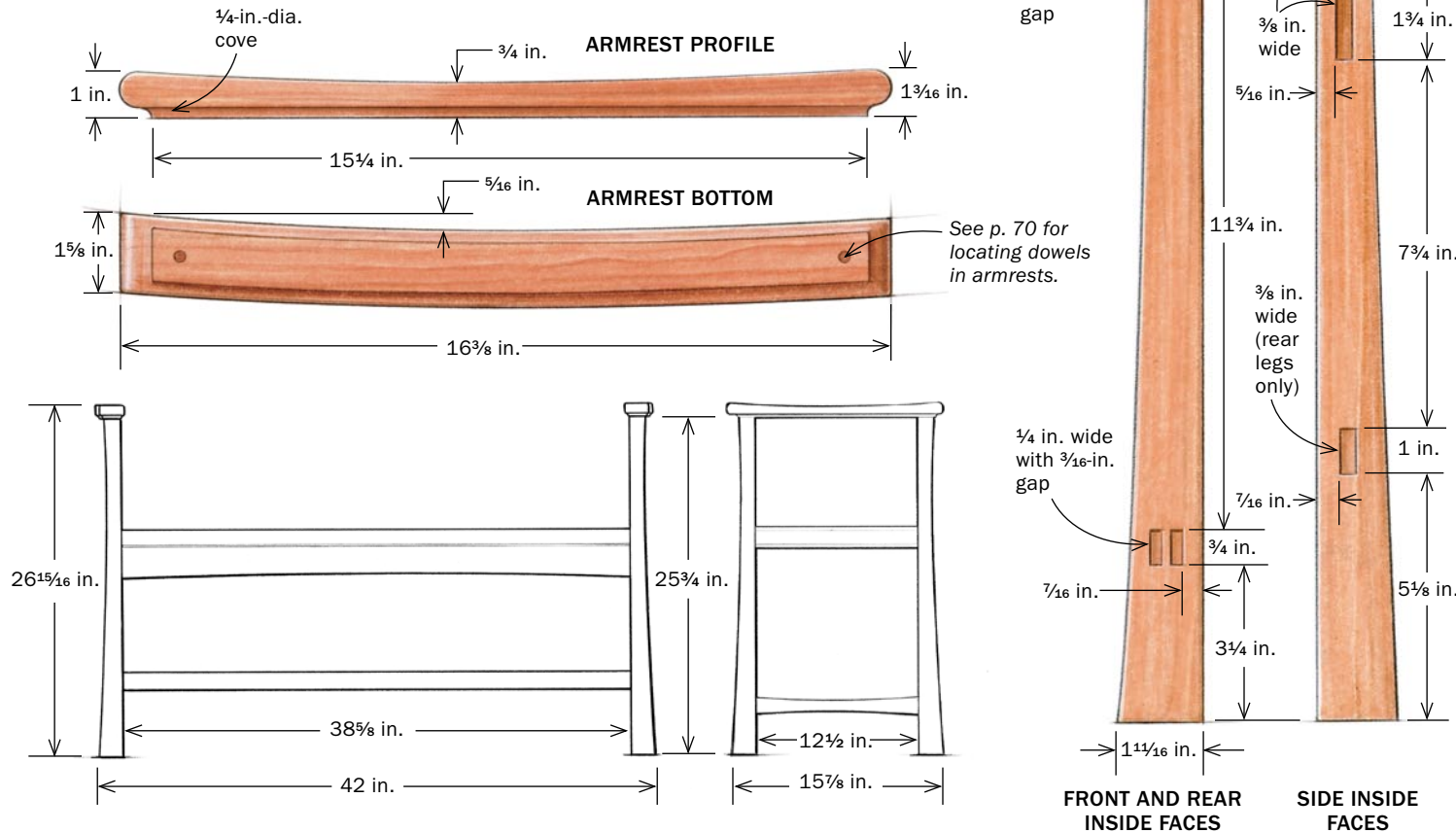


Bandsaw the curves. Once you've cut the curve in one face, tape the offcut onto the blank. It will help keep the leg square on the bandsaw table as you cut the second curve. Use coarse sandpaper, a scraper, or a spokeshave to smooth the curves. Don't worry if the curves aren't identical; the eye won't pick up minor variations.



A SIMPLE MORTISE-AND-TENON FRAME

Only the two outside faces of the legs are curved; the inside faces are straight where the mortises for the rails are located. That keeps the joinery simple.



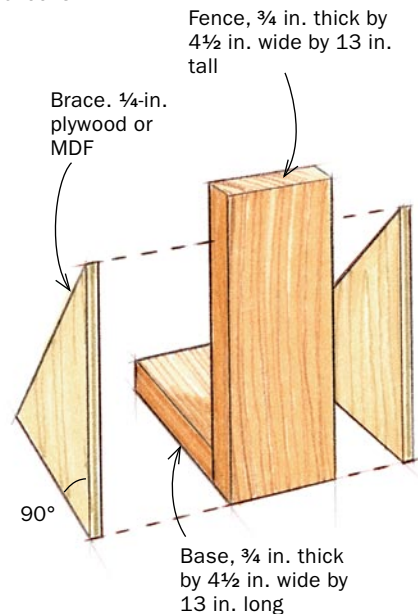
CUT THE TENONS ON THE RAILS



Cut tenon shoulders first. Edmundson uses a narrow, shopmade sled to cut the tenon shoulders, with a stop block clamped to it.



Add a tall fence to cut tenon cheeks. An auxiliary fence clamped to the sled supports the work when cutting the cheeks.



blanks, beginning with the side-to-side mortises. Remember not to mark mortises for a lower support rail on the front two legs. Similarly, transfer the locations of the front-to-back mortises from the template to the leg blanks, then trace the curve on the outside of each leg.

Refer again to the drawing for the widths of each mortise, the distances from the edge of the leg to the mortises, and the spacing between double mortises. Tenon lengths tell you the depth of each mortise. Transfer these measurements to each leg, then cut all the mortises, using a router or a hollow-chisel mortiser. If you use a router, chop the ends of each mortise square with a chisel.

Saw tenons on the stretchers

Dimension the rails and cut them to length, then mill the tenons. Use the tablesaw and miter gauge to cut the tenon shoulders first, and then use a tablesaw tenoning jig (see drawing, above right) to cut the cheeks.

To mill the double tenons, cut the tenon shoulders, then load the piece in the tenoning jig and saw away the $\frac{3}{16}$ -in.-wide space between the double tenons. I make one pass over the blade, then rotate the piece 180° and make another pass, checking it with the leg to see if the gap is tight.

CUTTING THE DOUBLE TENONS



Begin in the middle on the double tenons. Once you've cut the shoulders, cut away the waste between the tenons in the middle of the stock (left). Cut the inside face of one tenon, then rotate the stock 180° for the second cut. Creep up on the right distance, using the leg to check the fit. Finally, cut the outside cheeks and ends (right).



When the fit seems good, cut all the spaces between double tenons, then change the setup to cut the outside cheeks. Lower the blade to $\frac{1}{8}$ in. above the table and make a cut, checking the results against the mortise in the leg. When it's to your liking, raise the blade so that it is just below the shoulder crosscut and make a pass. Rotate the work and cut the other side. You'll have to clean up a bit of wood between the tenons with a narrow chisel or file.

Finally, cut the two small mortises on the inside of the long support rails. These

will house two short auxiliary stretchers. Wait to cut those stretchers until you have dry-fit the rest of the bench.

Dry-fit and cut the curves

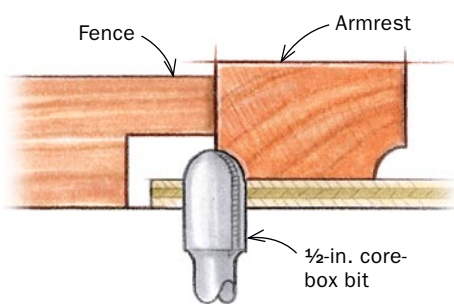
Assemble one pair of legs and short rails, fit the long rails in place, then press the remaining legs and short rails in place. Pull the joints together with clamps to be sure the mortises and tenons seat properly.

Be sure there's at least a $\frac{1}{8}$ -in.- to $\frac{3}{16}$ -in.-wide gap between the long weave rails and the support rails below them. A

SHAPE THE ARMRESTS



Bandsaw curves. Begin with the curve for the top of the armrests (above), then bandsaw the curves for the sides (right).



Route a cove on the underside. The cove gives the thick armrest a lighter look. Edmundson uses a narrow shopmade guide that clamps to the router table and sits above the blade. It follows both the convex and concave sides of the armrests. Reset the stop for the end-grain cuts.



Drill for dowels. Use $\frac{3}{8}$ -in.-dia. dowels to connect the legs to the armrests. Drill the legs first, then use dowel centers (left) to locate the holes in the armrests. Position the armrest and press down (right). Now you can drill the mating hole in the armrest.



smaller gap will make it hard to weave the Danish cord. Plane the support rail if you have to widen the gap between the rails. Also, be sure that the tenon shoulders on the long weave rails don't interfere with the tenon shoulders on the adjacent support rail.

If everything looks good, make the auxiliary stretchers to fit between the long support rails. After the initial dry-fit, cut the curves on the legs, lower side rails, and front rail on the bandsaw.

There are several tools you can use to clean up the bandsaw marks. I use a thin piece of wood wrapped in P100-grit sandpaper, a shopmade plane with a gently curved sole, a spokeshave, a scraper, and a block plane. Check your progress against the leg template. No two faces will be exactly the same, but that's all right. Just be sure the legs don't seem too bottom-heavy and that they flare out a bit at the top.

Finish shaping the legs by chamfering the corners. I also like to plane a gentle taper on the inside straight faces. Scribe a line $\frac{1}{16}$ in. from the top inside edges. Plane from the top of the mortises to those scribe lines.

The top and bottom faces of the lower side rails have the same inside curve as the armrest. Align the armrest template $\frac{1}{16}$ in. below the top and bottom faces of the rail, then trace the curve. You may want to plane the outside edge of the rail so it aligns with the edges of the legs. Chamfer the corners as you did the legs.

You also can use the inside curve of the armrest template to plot the gentle curve at each end of the long support rails.

Shape and join the armrests

When the legs and rails are to your liking, rough out the armrest on the bandsaw, and clean up the curves with sandpaper and a scraper. Use a router table and a core-box bit to cut a $\frac{1}{4}$ -in.-radius cove on the underside. Finally, round over the ends of each armrest.

Join the armrests to the legs with dowels. Use dowel centers (see photos, left) to mark the locations of corresponding holes in the armrests.

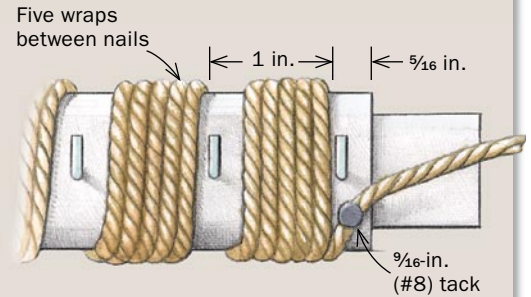
Prepare the seat rails

Round over the four weave rails at the router table. The short ones have a $\frac{3}{8}$ -in. radius on all four edges. The long ones have a $\frac{3}{8}$ -in. radius on the top outside and



Attach the nails that hold the cord. Drill pilot holes along the seat-support rails and hammer the L-shaped nails in place.

ADD NAILS AND WRAP THE LONG RAILS BEFORE ASSEMBLY



Wrap the long rails. Tack the cord to the end of the rail, then spin the rail to wind the cord. Wrap the cord five times between each nail, creating a gap at the nail that subsequent weaving will fill. Golf gloves reduce wear and tear on fingers.

ASSEMBLE THE BENCH



Glue up the end frames. Curved offcuts again make ideal clamping pads. Because Edmundson oils the components before glue-up, he puts leather scraps between the leg and offcut to protect the finish.

lower inside edges and a 1/4-in. radius on the other edges. That's partly for comfort, partly to make it easier to cinch the cord.

Finally, drill rows of 1/16-in.-dia. pilot holes in the weave rails and drive in the L-shaped nails to hold the Danish cord.

Also, drill a pair of holes on top of the front support rail for #8 2 1/2-in. screws. They secure the weave rail to the support rail and keep it from bowing.

Prewrap the long weave rails with Danish cord. While the cord will cover the short weave rails, the front-to-back warp strands won't cover the long rails by themselves. The wrapping fills in the spaces (see photos and drawing, above).

Glue up the bench, then weave

I finish all the pieces before glue-up. (You can find the finishing recipe free online at www.finewoodworking.com/extras.)



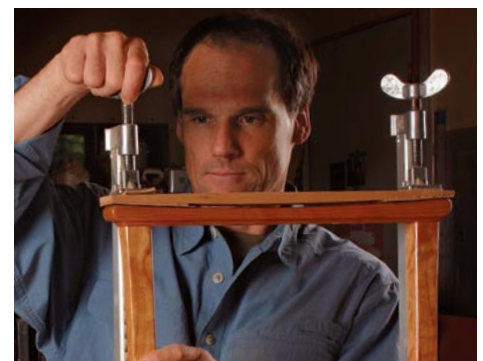
Add the long rails. Once the glued-up end frames are dry, connect them with the long rails. Then screw the weave rails to the support rails.

Glue the legs and short rails together first, using the leg offcuts as pads. Then attach the armrests.

Spread the cord on the long weave rails so it's evenly spaced over the screw holes in the support rails. Drive the screws until they begin to seat; stop before they pull the two rails together.

Weaving the Danish-cord seat is the final step (see pp. 72-73). It takes me about three hours. But if this is your first experience with a woven seat, allow more time until you get the hang of things.

Mark Edmundson builds furniture and cabinets in Sandpoint, Idaho.



Clamp armrests last. The offcut from the curved top acts as a clamp pad. Use the edge of the bench to hold one end of the clamp, and tighten it directly over the leg.

How to weave with Danish cord

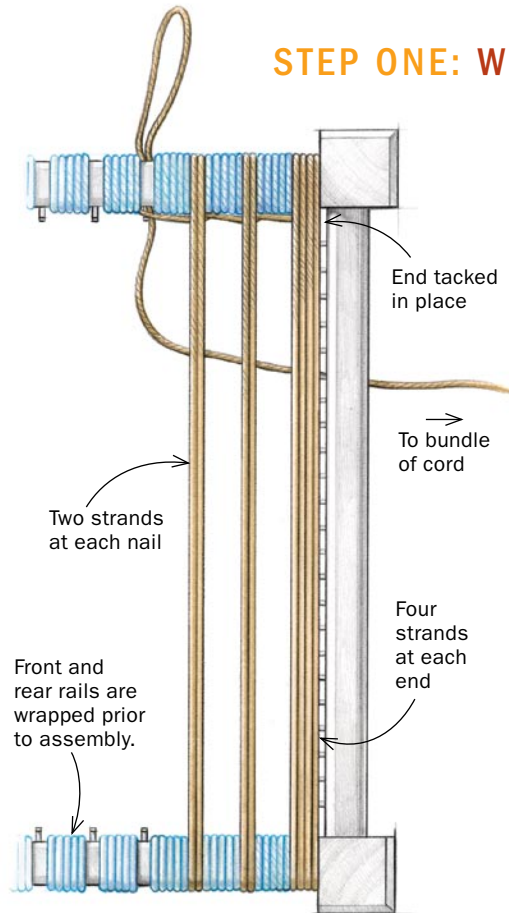
Danish cord resembles thick hemp twine, but it's made from strands of tightly rolled paper. You weave the seat by looping the cord over L-shaped nails driven into the inside of the weave rails. The cord comes in 2-lb. bundles, about enough for a single chair seat, or in 10- to 11-lb. rolls, ample for two benches. You can order the nails and cord from several retailers, including www.caning.com, www.caneandreed.com, and <http://catalog.countryseat.com>.

Online Extra

To watch a video of Edmundson weaving the seat and to get the finishing recipe for this project, go to FineWoodworking.com/extras.

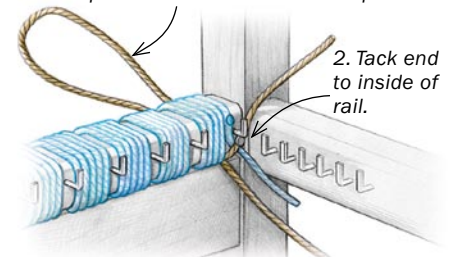
.com. Before you begin, wrap the long weave rails with cord, as shown on p. 71. Then do the weaving in two stages: First, run warp strands from front to back; then, weave cord from side to side. No need to measure; you're always taking a loop of cord from the bundle, hooking it on a nail, passing a looped end to the other side of the bench, and hooking it onto a nail.

STEP ONE: WEAVE FRONT TO BACK

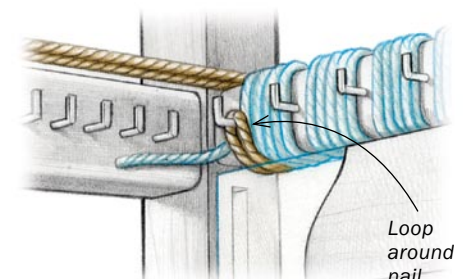


1. Start the warp. Loop a length of cord, keeping the strand from the bundle toward the center of the bench. Push the loop under the front weave rail next to the leg.

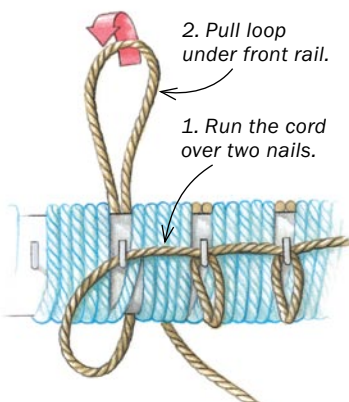
1. Pull loop under front rail and over top.



2. Bring the loop to the rear rail and hook it on a nail. This makes the first two warp strands. Repeat for a total of four strands on the first nail.

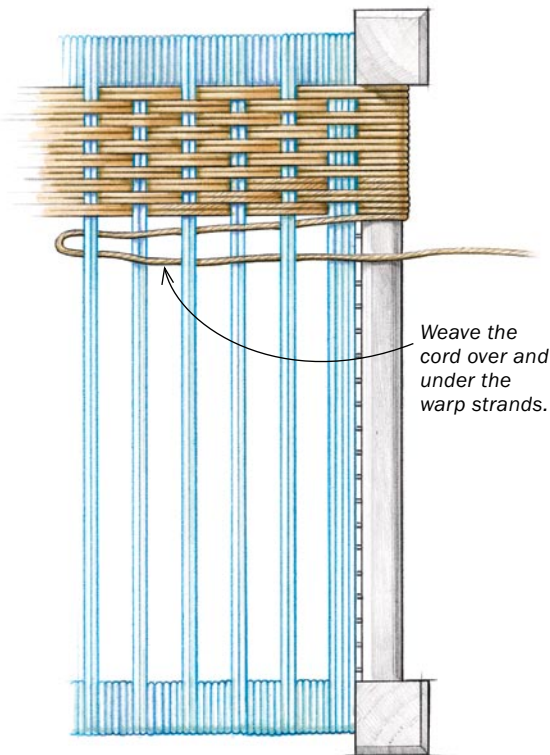


3. Hook the cord and drag it to the next nail. Pull the cord taut and hook it over the first nail. Bring it across the top of the next nail. Make a loop with the strand from the bundle to the outside, and push it under the front rail.

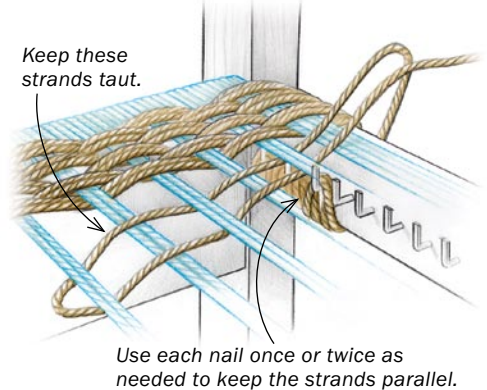


4. Continue running the cord from front to back, with a pair of warp strands hooked over each nail. Finish with four strands at the end, twisting the loop so that the strand from the bundle is closest to the leg.

STEP TWO: WEAVE SIDE TO SIDE



1. Begin the weaving. Start at the rear of the bench, tacking the cord in place at the corner of a leg. Make a loop, and bring the cord over the short weave rail. Push the loop over the group of four warp strands, under the next pair, over the next, and so on until you reach the opposite side. Keep the weave strands snug, but not so tight that they make the warp strands flex up and down.



2. Hook the cord and weave it again.

As you weave toward the front of the bench, hook the cord twice over each nail in the short rails. In order to keep the weave strands parallel to the long rails, you may need to hook the cord only once over some nails.



3. Push each weave strand in line. Each time you weave the cord through the warp strands, use your fingers to push the cord snug against the weave. When you're about halfway through the weave, sight down the length of the bench to be sure the weave strands are straight.



4. Tack down the weave cord. Turn the bench upside down and tack the end of the weave cord to the leg. Work the pigtails of cord at the corners out of sight, tucking them under the L-shaped nails.



5. Clinch the nails. Carefully tap the short leg of the L on each nail down over the cord. If you break a nail, use pliers to pull out the stub and tap in a replacement, making sure you catch all the loops of cord.



6. Straighten the weave. Use a thin stick to push any wayward strands into alignment. Don't try to make everything perfect; it's better if the seat has some small variations to signal that it's been woven by hand.