



A client approached me about a Tudor-style garden bench I had made for the local university. She loved the bench, but wanted something more Asian in style. I decided to incorporate elements from Gary Rogowski's Asian-style bed (*Home Furniture* #8, p. 43; also shown in gallery on FineWoodworking.com), adding a curved back rail and armrests as well as tapered back splats with a cross rail between them. The final design is a blending of Asian aesthetics and traditional Tudor style. The curved top rail, armrests, and tapered splats are very reminiscent of Buddhist temple gates in Japan, while the straight, chunky front legs and angled back legs are strictly Tudor.

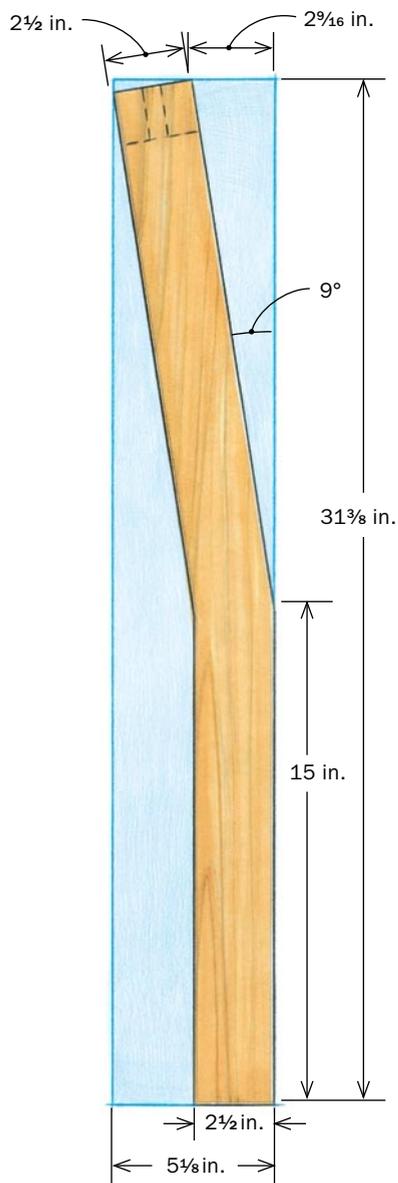
Since this is an outdoor bench, I used teak. Highly weather resistant, teak is my first choice and is worth the expense and extra care it takes to work, but there are less-expensive woods such as Spanish cedar, white

Japanese Garden Bench

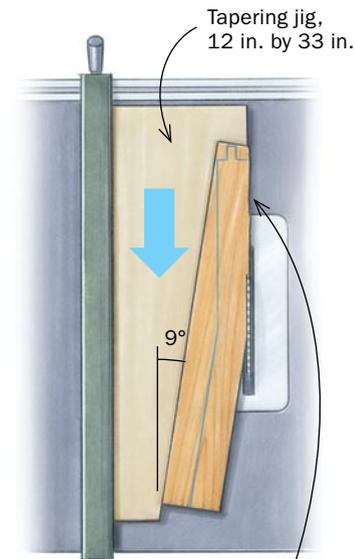
Mortise-and-tenon joinery
and outdoor-friendly materials
ensure a long, happy life

BY RUSSELL JENSEN

SHAPE THE REAR LEGS



Use a tapering jig for the front angle. After cutting close to the line on the bandsaw (left), make a simple tapering jig to clean up the cut on the tablesaw (below).



Trim waste on bandsaw before cutting final taper.



Make stop cuts on the back. Jensen cuts close to a pencil line, and then turns off the saw before removing the piece and flipping it to cut the other end (left). A quick stop at the spindle sander cleans up the waste that remains (below).

oak, ipé, and jatoba that also work well outdoors. This bench is built almost entirely with mortise-and-tenon joints, and because there are so many, you'll need an efficient way to crank them out. I'll demonstrate a simple template-guide jig for the mortises, and time-tested methods for making tenons to fit. Even though teak can be tricky to glue, the combination of mortise-and-tenon joinery and marine epoxy ensures the bench will last.

Choosing and milling the stock

I made the bench out of 4/4, 6/4, and 8/4 teak. Start by rough-cutting the lumber a couple of inches longer than you need. All the 2 1/2-in.-thick parts, such as the legs, arms, and curved back rail, are made of 6/4 stock glued together with West System epoxy. I do this because 12/4 teak is expensive and hard to find, but it is a good idea regardless of the wood. When choosing



TEAK GARDEN BENCH

Epoxy, good outdoor wood, and mortise-and-tenon joinery combine to create a bench that will endure the elements.

stock for the rear leg, steer away from using plainsawn stock on the front of the leg, as this will result in an unattractive, stepped-grain pattern when the angle is cut.

After gluing the legs, arms, and rear rail, allow the epoxy to cure and then mill all the lumber to thickness. Now true up all the edges on the jointer and rip everything to width. To give yourself a little play when cutting out the patterns, leave about 1/4 in. extra on the width of the curved pieces and tapered back splats.

Shape the rear legs

The straight, square front legs are easy to mill and lay out. The rear legs are more of a challenge. First, lay out the shape on the blanks. Then rough out the front angle at the bandsaw, staying 1/16 in. proud of the line. Now use a shopmade tapering jig on the tablesaw (see photo, p. 39) to cut a clean taper. Even though the bandsaw is an extra step, removing most of the waste first makes for a cleaner and, more importantly, safer tablesaw cut. Next, rough out the back of each leg at the bandsaw, followed by a series of stop cuts at the tablesaw to clean up the bandsaw marks and size the leg to 2 1/2 in. The material that is left can be cleaned up with hand tools or at the spindle sander. With the rear legs cut to shape, cut them to length.

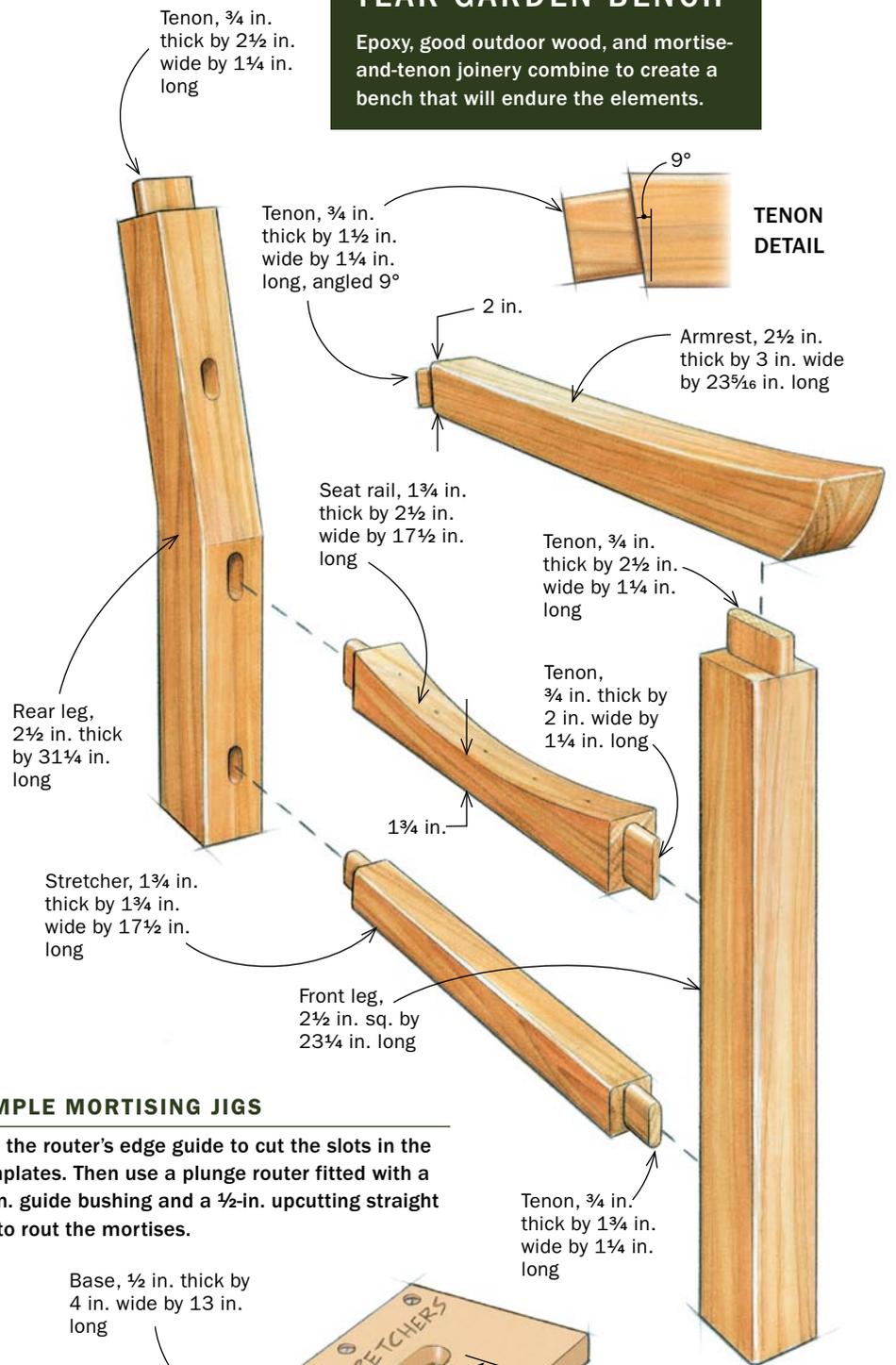
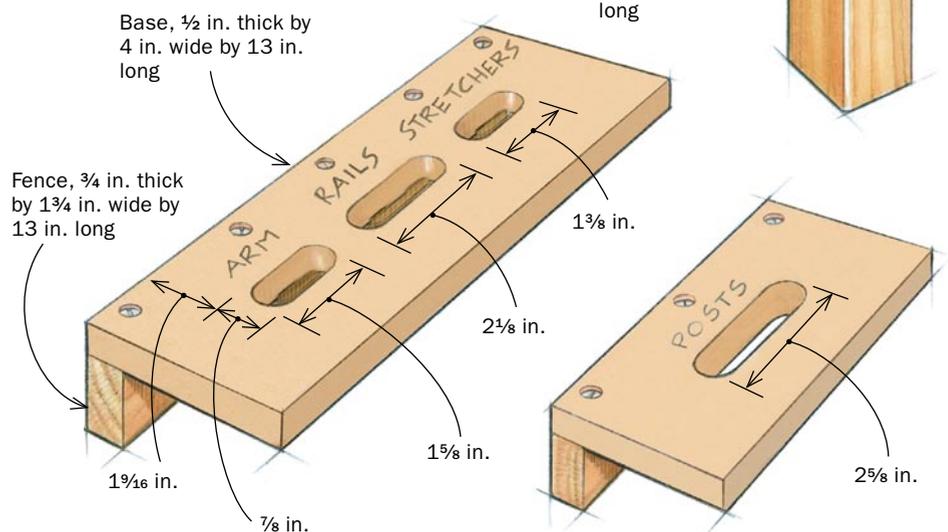
Quick, accurate mortises with a router

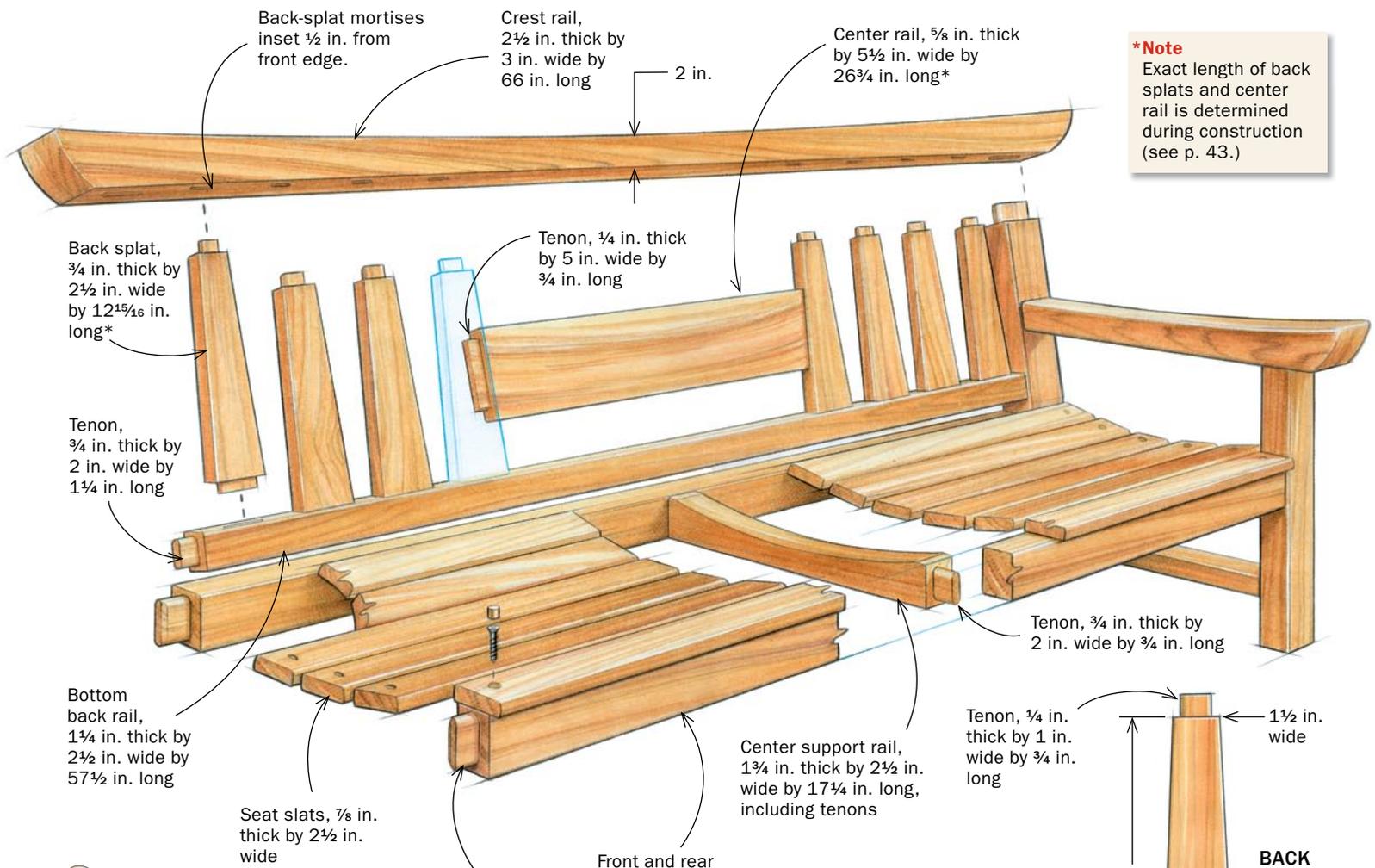
There are 40 mortises of four different lengths in this bench, but you can simplify the process



SIMPLE MORTISING JIGS

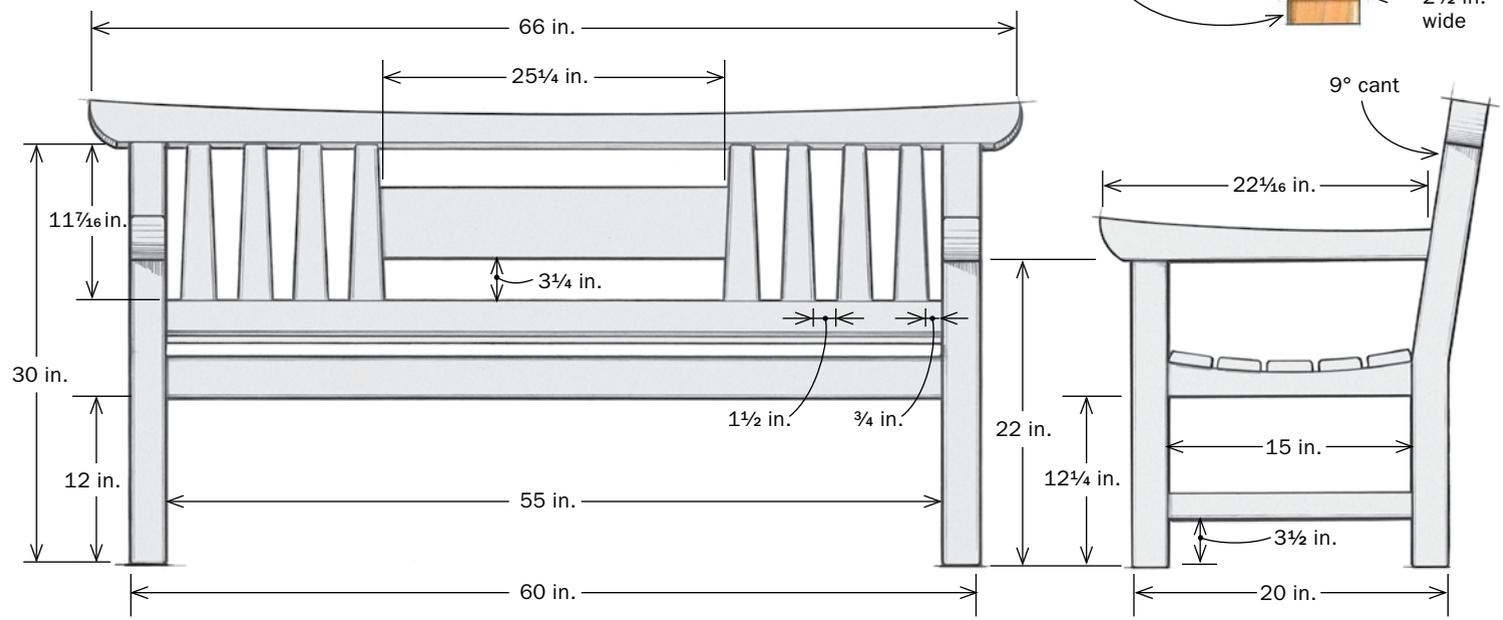
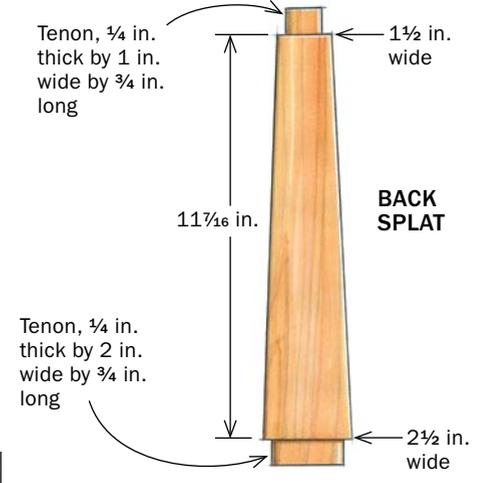
Use the router's edge guide to cut the slots in the templates. Then use a plunge router fitted with a 5/8-in. guide bushing and a 1/2-in. upcutting straight bit to rout the mortises.





***Note**
Exact length of back splats and center rail is determined during construction (see p. 43.)

Full-size plans for this bench and other projects are available at FineWoodworking.com/PlanStore.



CUT ANGLED TENONS ON THE ARMRESTS



Cut stock to size. Use a miter saw to cut the blank to size with a 9° angle at the tenoned end.



Cut the shoulders and cheeks. Place the angled end against the rip fence to set the miter-gauge angle and cut the shoulders. Then cut the cheeks using a tenoning jig, keeping the end flat against the tabletop.



Move to the bandsaw. Once you've cut the cheeks and shoulders, use the bandsaw to make the angled cuts at the top and bottom of the tenons and a handsaw to trim the remaining material.

MORTISE, THEN SHAPE THE CREST RAIL



Mortise for the back splats. A plunge router equipped with a guide fence makes cutting these mortises a snap (above). To lay out a graceful curve on the top edge (right), Jensen puts a clamp on each end, rests a strip of MDF against the clamps, and pulls the strip back, clamping it in place at the center.

using two easy-to-make jigs. Most of the mortises are $\frac{3}{4}$ in. thick, located where the legs meet the arms and where the legs meet the stretchers. I use jigs for these.

Sixteen smaller mortises join the back splats to the top and bottom stretchers that make up the back assembly. I make these by carefully laying them out and then outfitting my plunge router with an edge guide.

Once you have marked the mortises on all four legs, use a router equipped with a template guide and a jig. Each jig is $\frac{1}{2}$ -in. MDF with a hardwood fence screwed to it, and a corresponding slot routed in the MDF for each different-size mortise (see drawing, p. 40). To make the jigs, mark the

MDF and plunge the router in and along using the router's guide fence. Because I use a $\frac{1}{2}$ -in. upcutting spiral bit and a $\frac{5}{8}$ -in. template guide to make the $\frac{3}{4}$ -in. mortises, my template holes have to be $\frac{1}{8}$ in. longer and wider than the actual mortise. Making accurate jigs is essential to creating perfectly centered mortises, so testing them on a piece of scrap is always a good idea.

Rounded tenons for routed mortises

For the tenons, start by making the shoulder cuts on the tablesaw. Clamp a short stop block to the rip fence, and set the tenon length from the stop block to the far side of the blade. The block keeps the piece away from the fence as you make the cut and prevents a dangerous binding or a crooked cut. After adjusting the blade height, make all the shoulder cuts, then use a shopmade tenoning jig to make the cheek cuts. I cut the tenons to height on the bandsaw and complete the top and bottom shoulder cuts with a handsaw, cleaning up any roughness left from the handsaw cuts with a sharp chisel.

When making the back shoulder cut on the top of the rear leg, elevate the leg with a $\frac{3}{4}$ -in. shim so the lower, angled part of the leg doesn't interfere with the cut.

To fit the tenons in rounded mortises, make four small chisel incisions where the shoulder meets the corners of the tenon, and round over the corners with a rasp.



Angled armrests are a fun challenge

Making the armrests is tricky, due to the angled tenon that fits into the rear leg mortise. First, set a miter saw at 9° and cut off

MAKE THE SPLATS

Real-world measurement. Dry-fitting makes it easy to measure the exact shoulder-to-shoulder dimensions of the back splats.



Taper the back splats after cutting the tenons. Use two jigs to create the tapered back splats. The first holds the square splat and the second (shown) holds the splat that has one side already tapered.



the end of the blank where the tenon ends. Then move to the tablesaw. Instead of relying on the angle gauge, use the angle on the end of the arm blank, resting it against the stop block and angling the miter fence to meet it. Then cut the shoulder on both arms, adjust the miter gauge to the other side of 9°, and cut the other shoulder. Next, bring the arms to the tenoning jig, lay the 9° angle flat on the table, clamp it into the jig, and cut the tenons. Again, lay out the width of the tenon and cut it freehand on the bandsaw. Then remove the waste with a handsaw and round the edges with a rasp.

Curved pieces create an Asian feel

Now you are ready to cut the curves for the armrests and crest rail. Again, careful layout is the key. With a pencil, draw the shape directly on the stock. Create the radius at the ends with a compass. For the long curves, I simply bend a thin piece of MDF, held back by clamps, and trace the line. Step back and look at the lines, redrawing them until they look good.

Once I have settled on the shape, I cut it close to the line on the bandsaw, and then finish at the spindle sander or with a sanding drum on the drill press. If you are unhappy with the smoothness of the curve after using the spindle sander, some aggressive sandpaper, a slightly curved sanding block, and good old-fashioned elbow grease will smooth out the curve



Mark the center rail. Add the tapered back splats to the dry-fit assembly, and clamp the center rail in position so you can mark its tenon shoulders.

nicely. When I have to make two identical parts, like the armrests, I work one at a time, using the first piece as a pattern for the second. I do this because the stock is thick. Ganged together, it measures 5 in., and I can only sand up to 4 in. with my spindle sander.

Use two jigs to taper the back splats

I dry-fit and clamp the whole bench except for the armrests. Doing this allows me

to measure for the back splats. I can determine their exact length from shoulder to shoulder, cut the tenons while the pieces are still square, and then create the taper. After I've accurately measured the size of the back splats, I make the tenons using the same method used previously.

The center rail is joined to the two center splats with a mortise and tenon. It is easier to cut the mortises in the two center splats before proceeding with the tapers. This

GLUE UP IN STAGES



Start with the ends. After cleaning the joints with acetone (teak's oily properties make this a necessity), Jensen glues and clamps the two end sections (above). The easiest way to glue and assemble the bottom rail, the seat rail sub-assembly, and the two ends is on end (right). Then tip the bench upright and clamp.

is accomplished the same way as the other mortises for the back splats. Lay out the position of the mortises on the two center splats, use double-sided tape to attach the piece to a larger block of wood (to safely balance the router), and cut the mortises. Once the mortises are complete, cut the tapers in the splats using tapering jigs. Keep a couple of the cutoffs from the tapering process to help out when gluing the center rail to the two splats.

Join the center rail to the back splats

Even though teak is very stable, I still like to make the center rail from a quartersawn piece that has the grain running as perpendicular to the face as possible. This offers a clean look and also minimizes expansion and contraction of the tenon.

Once you've added the tapered back splats to the dry-fitted bench, mark where



the bottom of the center rail will intersect with the two back splats. Align the two lines to the bottom of the center rail, clamp it to the splats, and trace out the two inside angles with a very sharp pencil. Transfer that same angle about $\frac{1}{16}$ in. past where the tenon will end and cut off that angle at the miter saw. Now you can proceed to make the shoulder cuts and tenons the same way as on the angled tenon of the armrest. Cut the tenons to final length after they are made.

Support rail eliminates flex in seat

Because the bench has a span of almost 5 ft., it is essential to mount a support rail to stop excessive flex under the seat slats.

The center support rail is essentially the same as the two end rails, but is $\frac{3}{4}$ in. longer because it goes directly from the front rail to the back rail, rather than front leg to back leg as the end rails do.

For the mortises, refit the jig used for the end support rails. Unscrew the wooden fence on the side of the jig and then calculate where it needs to be attached above the guide hole. Find the center on the insides of the front and back rails of the bench, clamp the jig down, and rout the mortises. After you have made the tenons on the blank, find the center on it and one of the end support rails. Put them together, lining up the center marks, and transfer the curve onto the center rail. You can



Glue the center rail to the center back splats. Jensen uses the cutoff pieces from the tapering process to create a square clamping surface (above). The tapered back splats, center rail, and crest rail complete the glue-up (right).



then proceed to cut out the curve at the bandsaw, and take it down to the line at the spindle sander.

While the bench is still clamped, predrill and counterbore for the seat slats. This will be almost impossible after the armrests are glued in place.

Before gluing up the bench, I put a 1/4-in.-radius roundover on all the exposed edges, being careful not to rout past the points where one piece joins another (I mark these transitions during the dry-fit). Rough transitions can be cleaned up with hand tools after glue-up.

Glue the bench in sections

I use slow-curing West System epoxy to glue the bench together. Its 50- to 60-minute open time eliminates drama in the workshop. I recommend breaking the glue-up into a few sessions.

Glue up the two ends first. Since some of the mortises intersect, it's important to lay down the assembly so that no epoxy gets into the adjoining mortises.

The next step is to glue the two long seat rails and the lower back rail into the two end pieces. This step requires three 6-ft.-long clamps.

Now, to prepare for the final assembly, glue the center rail to the two center splats. You can use the two cutoff pieces saved from the tapering process on the outside tapers to provide a square surface to clamp. Glue the center support rail to the front and back seat rails. After this has dried for 24 hours, clean up any squeeze-out with a sharp chisel. The final gluing is to join the tapered back splats and the curved top rail. This is where the slow-cure epoxy really comes in handy.

Now you can screw the seat slats into place with 1 1/2-in. stainless-steel screws and use a tapered plug cutter to make plugs for the counterbored holes. Glue the plugs into place and let them dry before cutting them flush to the seat slats.

Teak is a fascinating wood. Incredibly durable, it can survive outdoors untreated for decades. In fact, left unfinished it becomes more beautiful as it ages. Because of this, I leave the bench as is, except for "painting" the bottoms of the legs with epoxy to ensure that no water wicks into the end grain. □

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Plug the screw holes. After screwing the seat slats down, glue in plugs, then cut them flush.



Seal the legs. Seal the bottoms of the legs by coating them with the same epoxy used in the glue-up.