

Arts and Crafts Bed

Router templates help create smooth curves
and tight joinery

BY GARY ROGOWSKI

Your mother was right. You do have to lie in the bed you made. I think you'll find this more a blessing than a curse when you make this Arts and Crafts bed. The key is to be mindful that you're building on a larger scale than is probably normal for you. Constructing a bed requires a different approach than a smaller piece does.

Breaking down this bed into its several parts will make planning and assembling it much more manageable. Working with a

queen-sized mattress means you'll be building a rectangular frame about 61 in. by 82 in. (includes extra space for bed-clothes). The ends of this frame consist of another two frames, the headboard and footboard. So frame construction, albeit on a large scale, is all that faces you.

Build the headboard and footboard frames from the outside in: posts and long rails first, then vertical pieces and finally the center rails. Working your way in from the large to the small is an important

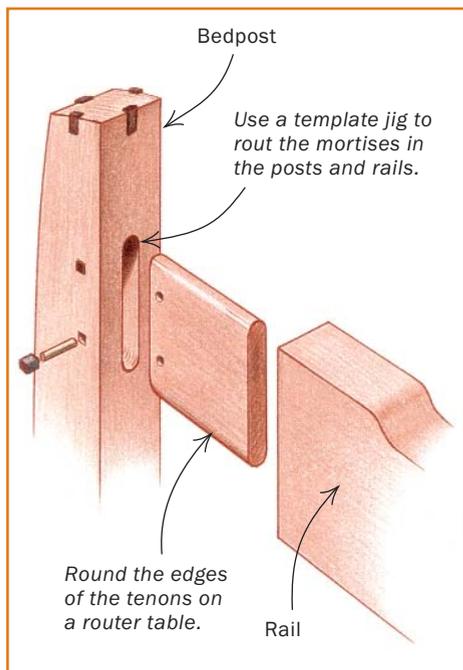
tactic for this project: You will dry-fit the outside pieces to get true dimensions for the internal members. Later, the glue-up will go in the reverse order, from inside to outside.

Full-sized drawings are invaluable

Certain design elements seem to fit quite naturally into this style of piece, such as the gently curved and tapered posts that meet the floor with a solid presence and the cloud lift, an element of Chinese furniture



Use a simple jig for the floating tenons



that Greene and Greene appropriated in the early 20th century. The cloud lift—a small S-curve, combined with a long, sweeping curve—appears in a few ways in this piece.

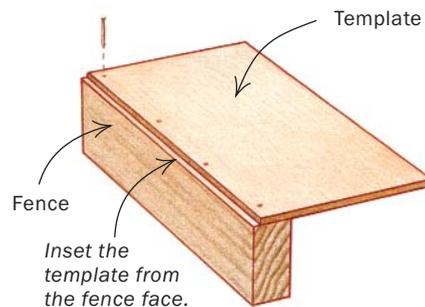
Texture in a piece is always important. I decided that inlaying raised strips of ebony in the post tops would give a stopping point for the eye and hand. The carved square plugs would do the same where I had pinned the joints. By stepping down the thicknesses of each adjacent part toward the center of the bed, I created shadow lines, another form of texture.

I finalized the design in a set of full-sized drawings. A full-sized drawing not only gives even better information about proportion, form, balance and negative space, but it also lets you plan out the details, seeing how they will work in the piece. I also use full-sized drawings to find graceful curves—bending a thin stick of oak, using a few weights to hold it in place, and tracing against it.

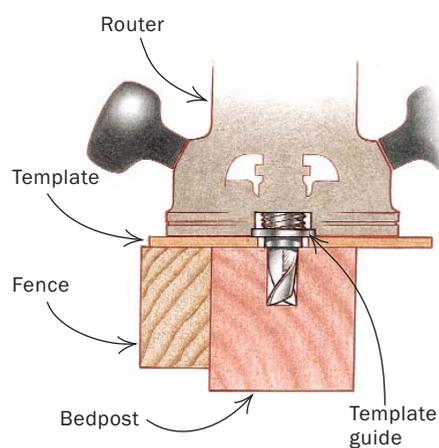
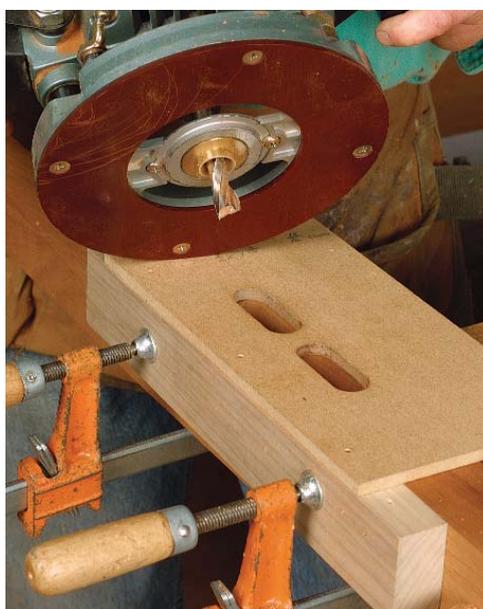
Because the headboard and footboard are symmetrical around their centerlines, I only had to make half views of each. Likewise, most of the template has to cover only half of the full profile.

Knockdown hardware is best for beds

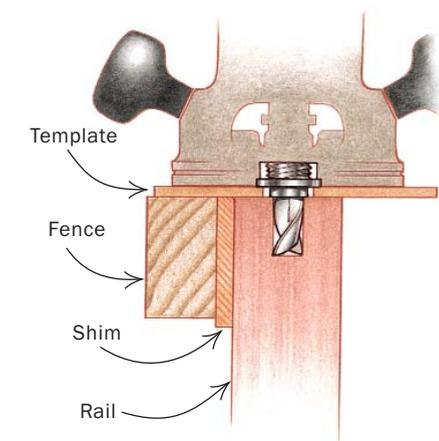
You'll need to remember one important fact: Once you build a bed, you must be able to get it out of your shop and into the



Make the template on the router table. Attach a hardwood fence to the ¼-in.-thick MDF template, leaving it slightly proud of the edge. Lay out the slots and drill starter holes to make it easier to rout the slots.



Mortise the posts first. Place the workpiece in a vise and clamp on the template. Take a few passes to get down to full depth, and stop often to vacuum out the chips.



Template routing is easy on the ends of long rails. The rail is thinner than the post, so to center these mortises you must insert a shim between the workpiece and the template fence.

bedroom. Therefore, it needs to be a knockdown design.

I use a wedging, locking style of hardware that is pounded together. The more weight you place on it, the more it locks into position. Also, this knockdown hardware is invisible when the parts are joined, better suiting the style of the bed. It requires mortising into both the post and the rail, but template routing takes care of this job. The mortises make this type of knock-down hardware much stronger than other screw-on types.

Note: Because end grain doesn't grip screw threads as well as long grain, use 3-in.-long screws to attach the male side to the ends of the rails.

Bag the box spring

Many people believe the combination of box spring and mattress is the only way to rest easy. But consider that the purpose of the box spring is to provide spring, support and ventilation for the mattress. All of this can be accomplished—at a fraction of the cost—by a row of slats laid on ledger strips (which are glued and screwed to the side rails). The slats are spaced out by means of dowels set into the ledger strips.

This bed is designed for a mattress or a futon alone. With this setup, most of the headboard will be seen, even if some well-meaning soul throws a gaggle of pillows across it.

If you're using a box spring and need more depth inside the rails, you can use an angle-iron ledger strip placed at the bot-

tom of the rail to buy yourself a couple of inches more.

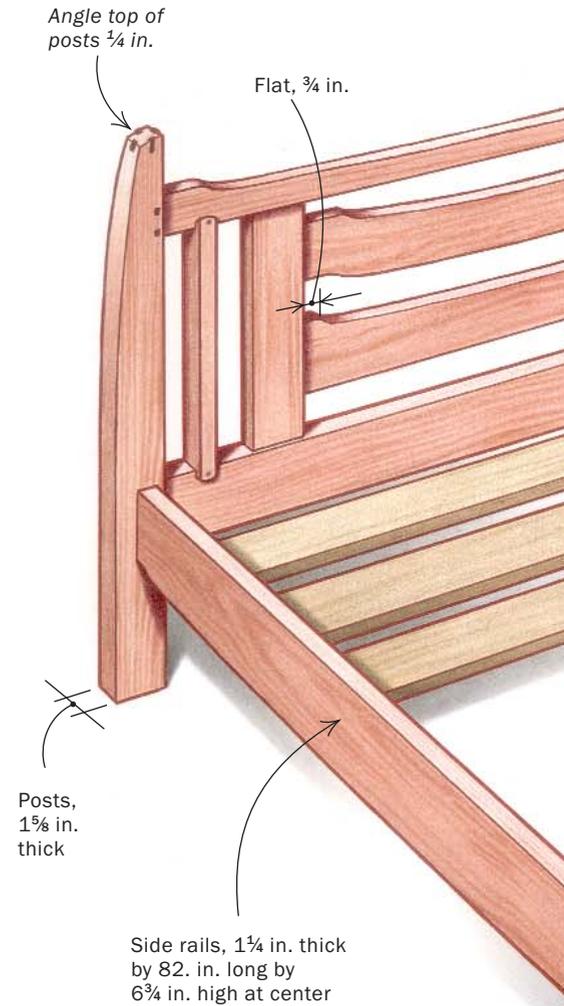
Long pieces demand special techniques

Rough-mill your stock $\frac{1}{8}$ in. over in thickness and width and let it sit stickered for about a week to acclimate to your shop environment. Then mill it straight and flat. After cutting away the waste areas on the shaped pieces, let them sit for a while as well, then mill the square sides straight.

Accurate crosscuts—When cutting the long rails to length, use a crosscut sled with an extra board on the extension table to support the long rails. I use the insert table from my planer, which is the same thickness as my crosscut sled. Also, to index each cut, clamp a long stick to the sled with a stop attached. Be careful that the stick doesn't flex when you place the rail against the stop.

Floating tenons for the post-to-rail joint—Once boards get more than 4 ft. in length, like these top and bottom rails, it becomes difficult to cut accurate tenons in the stock. So to join the thick, heavy posts and rails, I used floating tenons, which require only mortises. I cut the mortises with a mortising template and a plunge router fitted with a guide bushing (see the photos and drawings on p. 45). This setup makes it easy to cut identical mortises into both the posts and the ends of the long rails.

I always use a double tenon in rails that



Make templates for routing the long curves



Design the curves using a flexible batten. Rogowski lays out the curves on full-sized drawings of the footboard and the headboard. Only half of each symmetrical view is necessary.

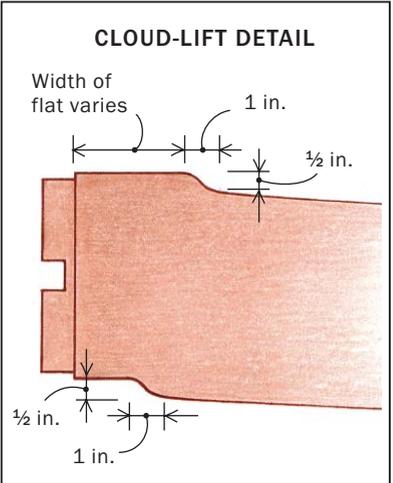
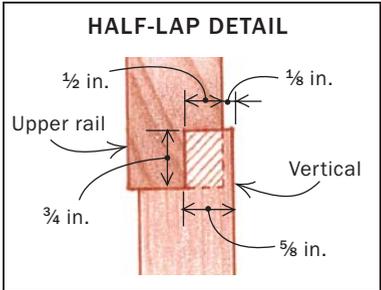
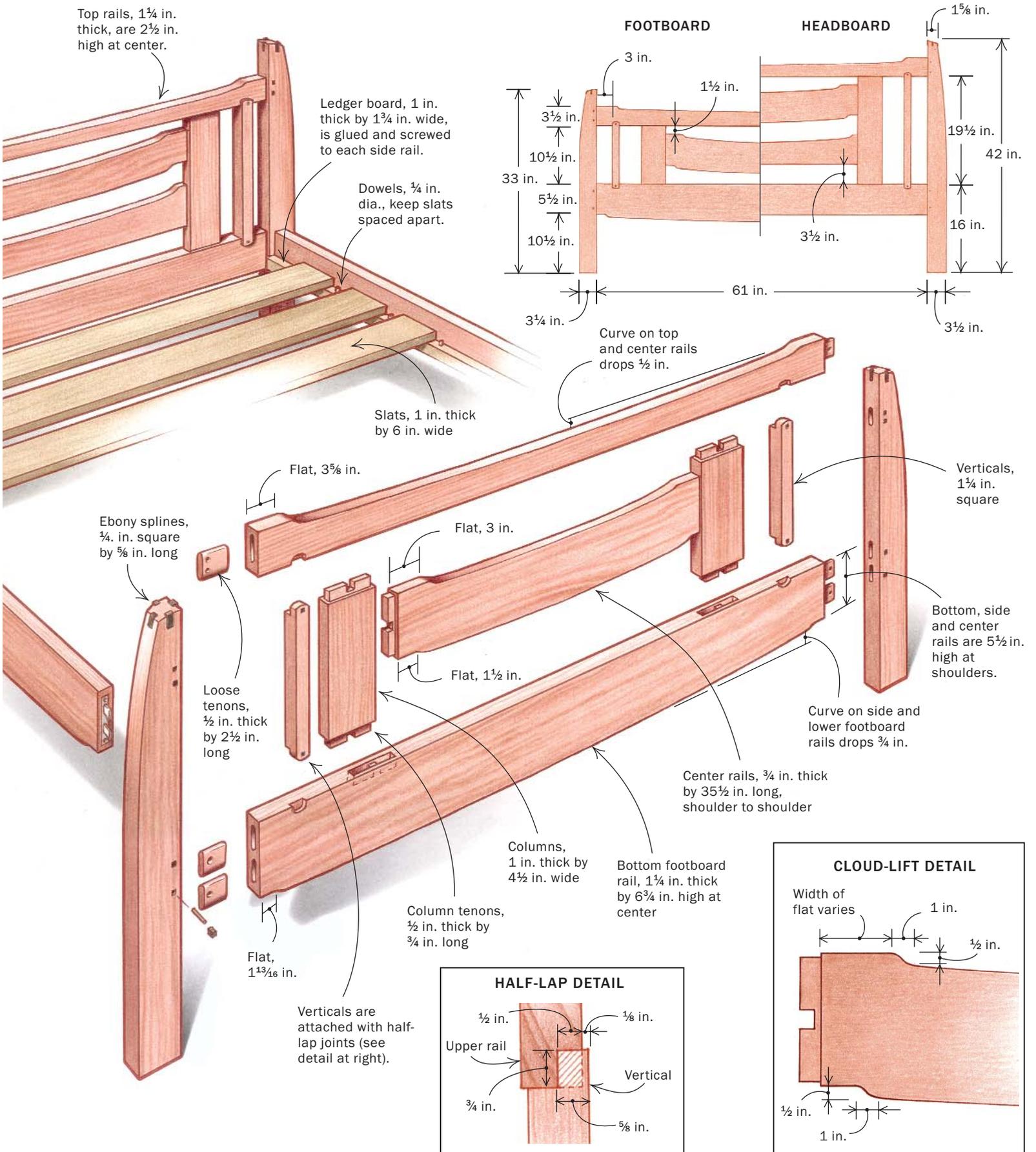


Lay out the same curve on a template. Take the beginning and ending points for the arc from the drawings, then connect the points using the same batten technique.

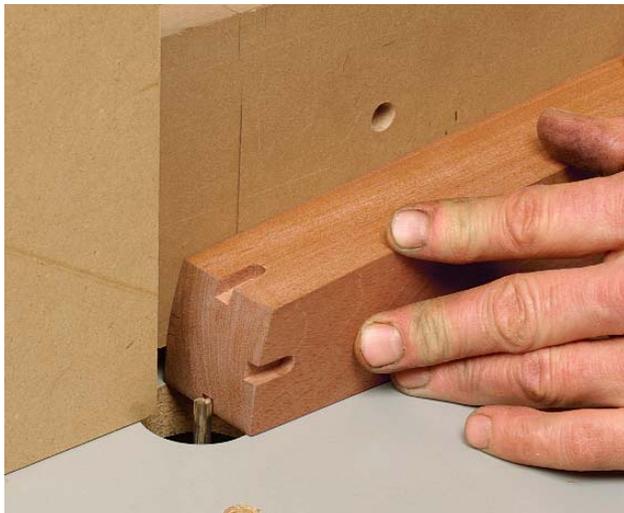


Route the curve one half at a time. Only a half template is needed. Use a bearing-guided bit and work downhill, with the grain. Then flip the workpiece and reattach the template.

MAHOGANY BED COMBINES GRACEFUL CURVES AND CLEVER JOINERY



Decorate the posts with splines



When routing the grooves, use a stop block. The tip of the post is angled, so you must reset the stop for each groove. Square the ends of the grooves with a mortising chisel (right).



Plane the ebony stock to fit. Get it close on the tablesaw, then use a block plane to creep up on a tight fit.



Soften the edges with a chisel. After gluing the ebony splines into place, pare and sand them to a gentle curve.

are more than 4 in. wide, to allow for seasonal movement across the grain. On this headboard and footboard, the bottom rails get double tenons.

Mortising templates—Make the mortising templates for the floating tenons out of medium-density fiberboard (MDF) and poplar. Lay out the slot on the underside of the template, figuring in the difference in diameter between the guide bushing and the bit. Lay out the template to center the mortise in the leg thickness.

Drill an undersized hole in the template at the end of each slot so that it's easier to locate the template over the spinning bit and to make the plunge cut easier. Also, if you use a router bit that is the exact diameter as your guide bushing, you'll be able to cut the slot in the template in one pass.

Before cutting the post mortises, rough out the curves on the bandsaw and mill the square sides flat. Make a template of an entire post and trace it onto the stock, aligning the grain for the best look and placing the tapered sections back to back to make best use of the material. Be aware that the posts in the headboard in this design are a bit wider than those in the footboard.

The center pieces receive standard mortises and tenons

After fitting the floating tenons, you can shape the long rail curves (I'll cover that

shortly), then put the frames together dry to check the distance between rails. Cut your verticals and columns to match this distance, plus their tenons, of course.

The wide tenons on the columns should be split into a haunched, double tenon. It just so happens that the same template you used for the floating tenons fits this mortise perfectly. Cut the two outer mortises using the template and a shim. Then move the template over, reset the bit depth and clear out for the center haunch.

Do your final fitting of the tenons by hand with a bullnose or shoulder plane. Remember, you shouldn't be able to knock your mortise-and-tenon joints together with your hat or have to use a hammer. A shoehorn fit is best.

Dry-fit the frame to check that your column shoulders snug up nicely to the long rails. You may need a clamp to pull them all the way home. Then check that the rails still fit into the post mortises. When everything fits well, check the distance between the columns to determine the length of the center rails.

Cut the center rails and lay out their mortises on the columns. Design these joints to be the same for all three center rails (two on the headboard, one on the footboard) so that you can make up only one mortising template. Cut these mortises and square their ends. After trimming the tenons to fit, you can shape the center rails.

Use half-lap joints for the verticals

The narrow verticals are let into the front side of the long rails with a half-lap joint. I wanted the vertical member to sit $\frac{1}{8}$ in. proud of the rail; inlaying its end lets you leave more material there after cutting away for the lap joint.

Start by notching the ends of the verticals. (It's a good idea to do this at the same time you make the wider center columns. This way you can cut the shoulders for the lap joints while you cut the shoulders on the tenoned center columns, ensuring they all are the same length.) Each vertical has a slight curve on its ends; the radius is $\frac{29}{32}$ in.

Use a drum or disc sander to shape the curved ends. These tools won't chip off the end grain the way a router bit will. After shaping the verticals, back-bevel the ends slightly.

With the ends of the verticals shaped and the notches cut away, lay the pieces onto the dry-fitted headboard or footboard. Use

Scribe and fit the half-lapped verticals



Undercut the curved tip for a better fit. Place a thin shim under the workpiece and take light, even passes to back-bevel the end. This will make the joint easier to fit.

a 3-in. spacer to set them the right distance away from the posts, and use a knife to lay out the mating recesses on the rails.

Rout the rails to depth freehand, coming as close to the layout lines as you can. Use a climb cut to prevent cutting past the line and a shallow gouge to finish up the curved cuts. When you finally fit these verticals into place, the undercut tips should fill up the recesses perfectly.

Templates also handle the curves

There are many curved parts on this bed, with long, sweeping arcs and tighter cloud-lift curves. It is inestimably simpler to shape each profile just once on a ¼-in.-thick MDF template and pattern-route the pieces than it is to draw the curves on all of the pieces and shape them individually. The only exception is the posts, where I went straight from the bandsaw to a bench plane.

Aside from the posts, all of the other curved profiles are symmetrical around a center point. So you need only half templates, which can be flipped over to cover the entire profile. Lay out the curves on your full-sized drawings and then your templates using a ⅛-in.-thick piece of oak or ash. Mark the high and low end points and use weights to hold the stick in place while you mark out a pleasing curve. Bandsaw the profile as close to the line as you can. Sand off the high spots, then smooth the long curves with a bench or block plane. Check the template often for high spots, dips or bad transitions. Use a spokeshave or drum sander to clean up the concave areas, and sandpaper on the transitions. (Make your templates smooth, and



Use the workpiece itself to lay out its mating recesses. A spacer block keeps the verticals parallel to the posts for layout. Use a marking knife to scribe around the ends.



A router sets the depth of the recesses. Use the tool freehand, staying away from the layout lines. Test-fit to check the depth.



Pare to the layout lines for final fitting. Use a shallow gouge with a sweep just tighter than the curve of the recess.

Mortise in the knockdown hardware

These plates are inlaid into the rails and posts, providing a strong, hidden joint that knocks down easily.



Rout the mortise for the hardware using a template-and-bushing router setup. The mortise depth is critical to the joint coming together properly. After routing, square the corners of this shallow mortise.



Lay out the recesses for the hooks. Remember that the hooks will be inserted straight inward, but then travel downward.



Rout the recesses freehand. The male plate will also need slight recesses behind it, to accommodate the back ends of the hooks, which protrude slightly. Use longer screws in the end grain of the rails, where threads don't grip as well.

you will have only minimal cleanup to do after the router operation. Time invested here will pay off many times over.)

Use the templates to lay out the curves, and then bandsaw to within $\frac{1}{32}$ in. of the line. Attach the templates to the parts with double-stick tape or use a carriage jig like the one shown on p. 46 (bottom right photo). The jig is simply a piece of $\frac{1}{4}$ -in.-thick

MDF with a strip of hardwood for attaching hold-down clamps. Both the stock and the template are clamped down in one shot, and the clamps provide safe handles for controlling the operation.

Use a flush-trimming bit on the router table to shape the curves. To avoid tearout, cut downhill, with the grain. You may need to make two passes to cut all of the way down to the template.

After routing, clean up the long curves with a spokeshave and sand the tight ones by hand. Use a scraper and fine sandpaper to finish the job.

Shape the posts—The posts were roughed out before being mortised, but they may need to be trimmed closer to the pattern line with a bandsaw. Clean up the saw marks with a spokeshave or handplane. A No. 3 bench plane or even the longer No. 5 works well on this gradual curve. Use a hand scraper to remove any tearout or plane marks. Cut the curved top of each post on the bandsaw and finish up with a spokeshave and sandpaper.

Pegs and splines add detail

Small ebony details add flavor to this large-scale mahogany piece. Some of the joints are pinned, and there are short splines in the tops of the posts.

Drill for the square plugs—I pin joints in two steps. I use a thin dowel to actually pin the joint, and a separate square plug that goes in afterward. If you drill for the square plugs while the parts are still separate, you can use the drill press instead of an unsteady handheld drill.

A $\frac{1}{4}$ -in. brad point set to drill $\frac{1}{4}$ in. deep is perfect. Set up a fence on the drill press and drill for all of the plugs required. You can square up these holes now with a $\frac{1}{4}$ -in. chisel, but you must wait until the joints are glued up to drill through the tenons, drive in the pins and add the plugs.

I mill the ebony plug stock in long sections. First, square two edges of a stick on the jointer, using a long push stick. Then rough out the other edges on the bandsaw. Using a thinner push stick on the tablesaw, cut the stick oversized about $\frac{1}{32}$ in. Plugs made from this stick will fill up any imperfections in your chisel work.

Add the spline inlay—The inlay grooves in the posts go in after the tops of the posts



have been shaped. Use a 1/4-in. bit in the router table, and set up a fence with a stop to index each cut. Square the end of each groove with a chisel.

Mill the inlay stock in long sections, the same way you did the plug stock. When trimming these sticks to size on the table-saw, leave the thickness oversized by a hair, so a pass or two with a handplane will fit the splines to their grooves.

Before putting in the post inlay, break the edge around the top of the post with a spokeshave. Make sure the inlay stock fits all of the way down into and to the end of the groove. After the glue has dried, trim down the inlay a bit with a block plane, bevel the edges a little with a chisel and then dome the splines with sandpaper.

Assemble from the inside out

Before assembling any parts, make sure they all fit together perfectly without any extra-heavy clamping pressure. Run through the glue-up dry so that you know where all of your tools, clamps and parts are. No surprises in a glue-up is a nice surprise. Glue the center rails to the columns first. While the glue is drying, put the columns into the rails to check that the center rails have gone in straight.

Glue in the columns to the rails next. But do another dry run first and thank yourself later on. Put more glue into the mortises—especially at the mouth of each joint—than on the tenons. Glue on the tenons tends to get scraped off. When the clamps are in place, use winding sticks to check that the long rails are not twisted. Also before the glue sets up, put the posts onto the rails dry and check across the diagonals to see that the frame is going together square.

Finally, glue the posts to the long rails. Glue the floating tenons into the rails first, one at a time. There's no pressure or rushing this way. Plus you can check if the tenons are going in straight and to full depth. Then glue the posts to the rails. Have long clamps ready to pull everything together. Also have an even longer clamp ready if you need to clamp across the diagonals. Once the clamps are on, check again to see that the frame is sitting flat.

Finish pegging the joints

I use 3/16-in.-dia. dowels to pin the joints. Drill into the bottom of the square holes you made earlier, through the tenon and into the opposite side of the mortise. Mark



Pin the joints in two steps

Use a dowel to pin the joint, with a square ebony peg on top. Before assembly, drill a shallow hole for the peg using the drill press. After glue-up, square the hole, then drill into the bottom of that hole and through the tenon to receive the dowel.



Leave the peg slightly proud and break the edges. Use a piece of laminate under the chisel to protect the surrounding wood. Finish with sandpaper to gently dome the peg.

the bit with a piece of masking tape to set the depth. Cut the dowel to the proper length and chamfer the ends with sandpaper. Put a spot of glue in the hole and drive in the pin until it is level with the bottom of the square hole. Use a steel pin to drive the wood pin home.

Chamfer the tip of the square stock with a chisel and cut off an oversized plug. Use a toothpick to spread some glue in the hole and pound the plug straight in with a metal hammer. When the sound of the hammering changes from a thud to a ping, you'll know the plug is home.

Now saw off the plugs to about 1/8 in. proud. Plane them lightly with a block plane to remove the saw marks. To form a shallow dome on each one, first carve away the edges of the plug with a chisel. Use a piece of laminate to protect the surface of the surrounding wood. Work from all four sides of the plug evenly toward the middle, then sand it to a gentle curve.

Now the piece is ready for finishing. I used a wiping varnish called

ProFin on this bed. Once you've attached the ledger strips to the side rails, assembled the bed, inserted the slats and put on your bedding of choice, you've made your bed—and you'll want to lie in it. □

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To take this Arts and Crafts bed to the next level, add a traditional silver inlay to the center columns, as described in this issue's Master Class (see p. 100).