Durable Outdoor Table

Ipé table will seat six and weather many seasons

BY DAVID BEDROSIAN

Last summer brought a new pool to our backyard. With it came more company and the need for a better outdoor table. Rather than purchasing something mass-produced, I designed a table to match the wooden deck that completes our backyard landscaping. Both the deck and the table are built from ipé (pronounced ee-pay), a dense South American hardwood. I like ipé for outdoor furniture because of its rich color, dimensional stability, and natural resistance to decay. But you could substitute white oak, cedar, or any other wood that will withstand the elements.

Ipé may not be available at the local hardwood dealer. You may have to visit a lumberyard that sells high-end deck material, or you can order the ipé online. It comes in a limited number of standard dimensional lumber sizes. Although the stock sizes may be limited, ipé comes planed and ready for sanding.

The table is about 5 ft. dia. and seats six comfortably. The top is made of 5/4 by 6-in. boards surrounded by an outer ring built from 12 segments of 8/4 by 6-in. stock joined with splines (see drawing, p. 56). Each inner board is glued and screwed into a groove in the outer ring. Gaps between the boards lighten the look of the top and allow water to drain. The gently curved legs attach to the base with mortise-and-tenon joints. An oil finish highlights the ipé's rich color.

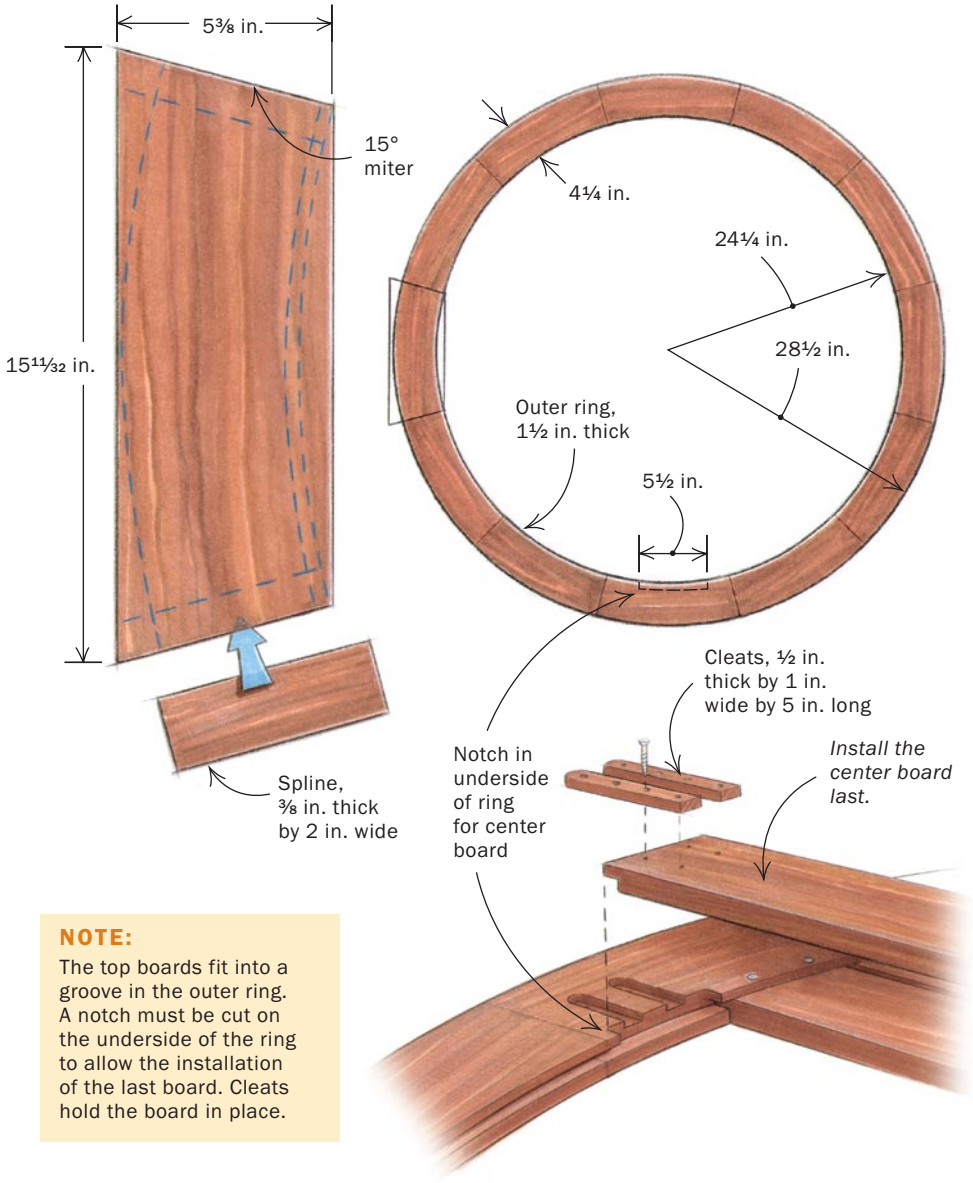
When you lift the first board, you'll notice that ipé is much denser than other woods. Although it can be jointed and planed with steel knives and light cuts, ipé is tough on tools. You must use sharp carbide blades and bits in your saws and routers. Even so, you'll need to rout in shallow passes. The wood is difficult to handplane, but it sands to a very smooth finish. Drilling was required for the stainless-steel screws I used throughout (to prevent staining). Also, it's important

12 SEGMENTS MAKE A ROUND FRAME

A sled guides cutting the segments to length. *Wedges cut to the 15° miter angle position the stock for crosscutting. The last two pieces won't be cut until the others are glued up, to allow for tweaking the final fit.*

Tenoning jig and a dado blade slot the segments. *Splines sawn from ipé scraps fit in the slots to secure the joints.*

Can you have too many clamps? *Blocks held to the segments with the red clamps provide purchase for small bar clamps to pull the segments together.*



NOTE:
The top boards fit into a groove in the outer ring. A notch must be cut on the underside of the ring to allow the installation of the last board. Cleats hold the board in place.

to seal all end grain or ipé will check. Take extra caution with ipé sawdust, a respiratory irritant. The oil in the wood makes the sawdust stick to walls, clothes, even the inside of dust-collector pipes. It also may stain other unfinished wood.

Because of ipé's oily nature, both the makers of Gorilla Glue and of Titebond III, two waterproof glues that I use for outdoor pieces, recommend gluing it soon after machining or lightly sanding the surfaces of joints if there is a delay before glue-up. I glued all of the joints within a few days of machining and have not had any joint failures. I used Gorilla Glue for the joints where the squeeze-out could be removed easily and Titebond III for the others.

Start with a full-scale drawing

Make a full-size drawing of the tabletop on a 5-ft. by 5-ft. sheet of plywood. This will show the exact size of the outer ring and later will serve as a support board for machining the top. To determine the inside diameter of the ring, measure the combined width of the nine inner boards including the ¼-in. space between them, and then subtract ¾ in. This will allow the inner boards to fit in a ⅜-in.-deep groove in the ring. Mark the centerpoint on the plywood and draw an inner circle of this diameter. Draw the outer circle's radius 4¼ in. larger.

Using dividers, lay out 12 equal segments representing the 12 boards that will make

Photos: Andy Engel; drawings: Bob La Pointe

Router on a trammel cuts the circle. *Blocks screwed to the plywood template secure the ring. After cutting a shallow groove, the author removes the ring and jigsaws the waste away. He finishes the cut by replacing the ring on the template and trimming with a router.*

up the ring. Then you'll know the exact length of each segment. The angle at the end of each segment is 15°. I cut 10 of the segments on my tablesaw using a sliding crosscut sled with a 15° wedge (see photo, facing page). Even a slight inaccuracy in the angle will lead to a gap between the last two boards in the ring, so I left those long and custom-cut them for a precise fit.

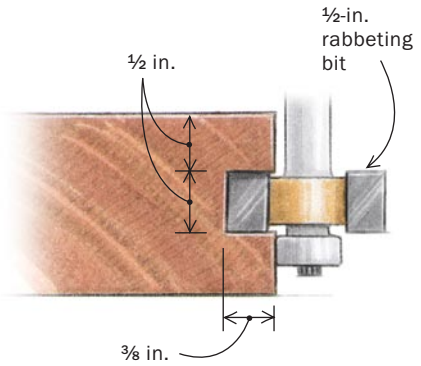
The joints between the segments are strengthened with ⅜-in. by 2-in. ipé splines that fit into grooves cut in the end of each segment. I glued the segments together one joint at a time using angled clamping blocks.

Rout the outer ring round

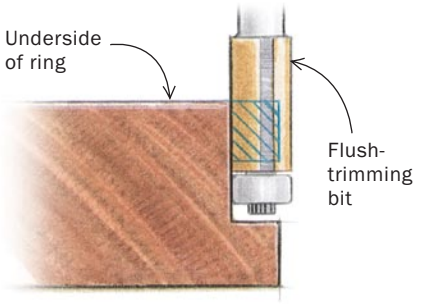
With the glue dried on the outer ring, the next step is to make it circular using a router and a trammel jig. Secure the ring to the plywood by screwing blocks around the inside edge of the ring. Be sure the ring is aligned with your full-scale drawing so that you can pivot the router trammel on the centerpoint drawn on the plywood.

I used a ½-in. solid carbide spiral bit to rout a shallow groove for the outside curve. I then lifted off the outer ring and used a jigsaw to cut away most of the waste. Then I reset the ring on the template

Groove the ring for the top boards. *A ½-in. bearing-guided rabbeting bit makes the cut. To control the depth on multiple passes, successively smaller guide bearings are used until the groove reaches ⅜ in. deep.*



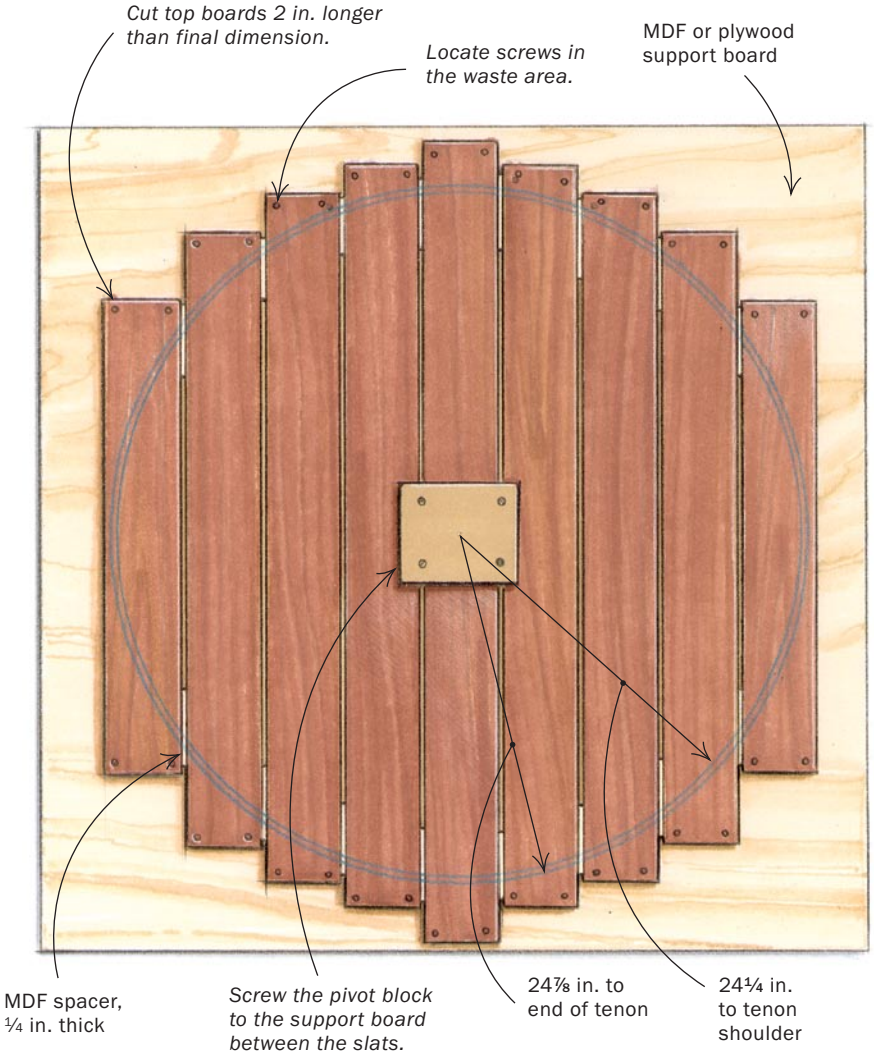
Clearance for the last board. *The shorter boards slide into the groove, but the last one must be dropped into place. Working on the bottom of the ring, a flush-trimming bit removes the necessary material.*



RADIUS AND TENON THE TOP BOARDS

Pivot block prevents marring the top boards. *Drive screws between the top boards to hold the block in place. A pivot pin in the trammel engages the center hole in the block.*

Rout the tenons first. *To minimize tearout, the author uses a ½-in. spiral up-cutting bit and ¼-in. MDF spacers between the boards where the router will pass. Take shallow passes until the tenon thickness matches the groove in the ring.*



and cleaned up the edge with the same router setup. After routing the outside of the ring, I fastened blocks around it to hold the ring in place and removed the inner blocks. I used the same procedure to rout the inner circle. A belt sander cleaned up the outside edges.

I routed a ½-in.-wide groove ⅜ in. into the inside edge of the ring to hold the inner boards (see photo, p. 57). To ensure that the ring and the inner boards are flush, the distance from the top of the ring to the bottom edge of the groove should equal the thickness of the inner boards. I used a ½-in. rabbeting bit and took several passes with guide bearings of diminishing size to get to the full ⅜-in. depth of the bit. If you are going to apply a finish to the table, apply it to the inside edge of the ring before routing the groove. This will prevent any problems gluing the inner boards.

A small section of the bottom of the inner ring must be removed so that the longest inner board can be inserted in the groove. Mark the width of an inner board on the ring and use a flush-trimming router bit to make this cut.

Lay out the top on the template

I chose grain- and color-matched boards for the top and cut them about 6 in. longer than needed. Use two screws at each end to

Adjust the trammel and rout the tenons to length. *Cut a deep groove ⅜ in. out from the tenon shoulder, stopping short of routing all the way through the boards. Unscrew the boards and finish the cut on the bandsaw.*

secure the boards to the plywood, good side up, placing the screws in the waste area. I used ¼-in. MDF spacers between the boards at the cut line to ensure consistent spacing and to minimize splintering. To prevent finish from getting on the glue surfaces of the inner boards, I applied finish to the sides of the boards before screwing them down.

The end of each board gets a curved tenon with a shoulder radius that precisely matches the inside of the outer ring. I used my router trammel and a scrap of MDF to fine-tune the radius for a snug fit.

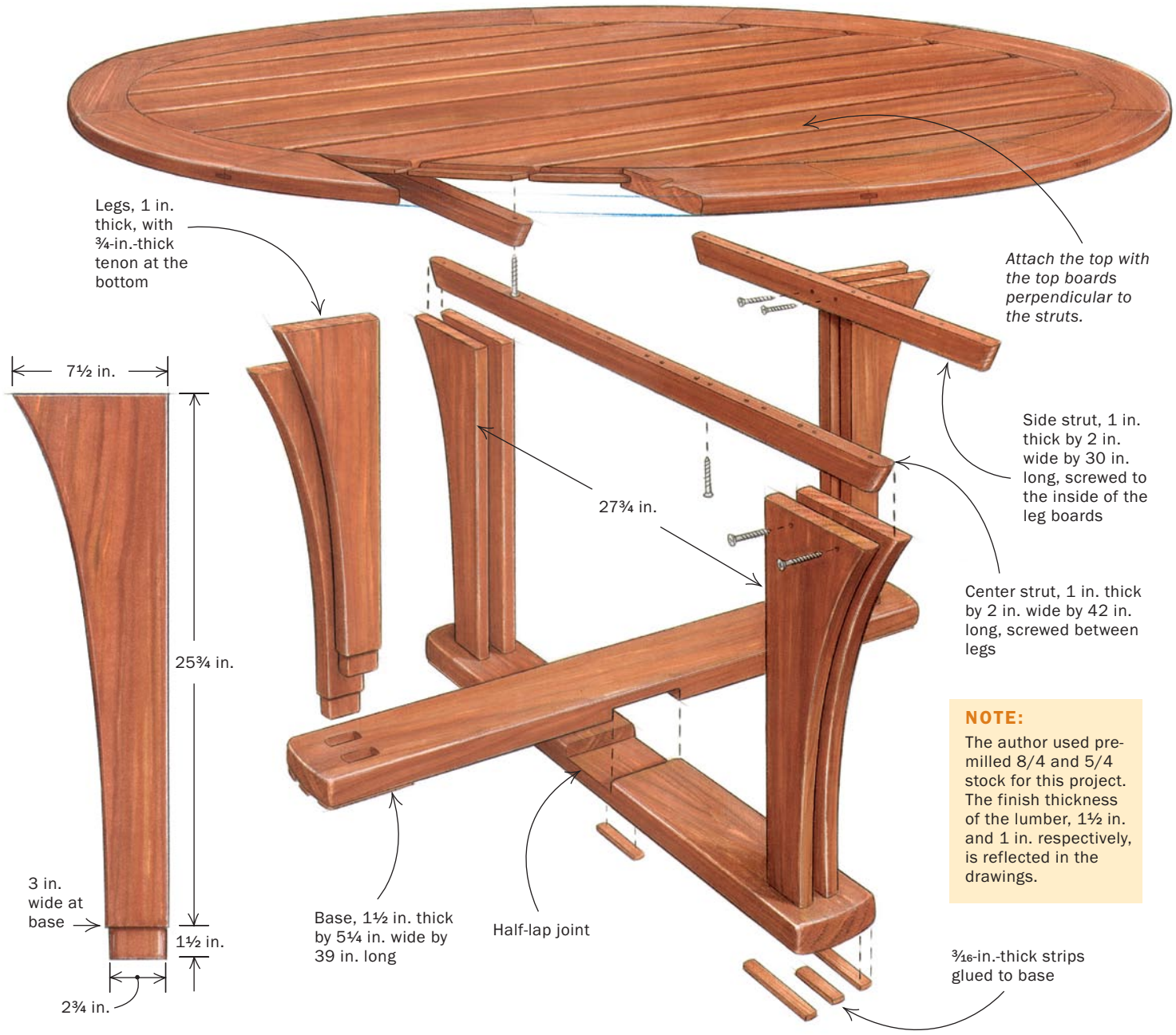
Rather than drilling a hole in the ipé for the centerpoint of the trammel, I fastened a scrap of ¼-in. MDF to the top with screws placed between the boards. A similar piece of MDF fastened to the trammel below the router ensured a 90° cut. I cut the tenons in several passes, increasing the depth of cut by about ⅛ in. until the tenon thickness matched the groove in the outer ring.

The tenons are cut to length by increasing the radius of the trammel by just less than ⅜ in., the depth of the groove in the outer ring. Make several passes until the bit almost cuts through to the plywood. Don't rout through the boards, as doing so would separate them from the screws holding them in place. I left about 1/32 in., which was cut easily on the bandsaw and then sanded flush to the tenon with my

Rabbeted top boards fit the ring. *Working from below, the boards are spaced with ¼-in. shims. A deadblow hammer adjusts them so that the final, center board aligns with the clearance slot.*

Cleats support the last board. *Fitting into channels routed in the ring, two cleats made from ipé scraps are screwed home.*

MAKE AND ASSEMBLE THE BASE



NOTE:
The author used pre-milled 8/4 and 5/4 stock for this project. The finish thickness of the lumber, 1½ in. and 1 in. respectively, is reflected in the drawings.

belt sander. Be sure to number each board to keep them in order for final assembly.

Dry-fit the top, starting with the small boards. The middle board is last and should fit into the groove at one end and the cutout at the other end. Position the boards and then drill holes for two screws at the end of each. Clearance holes in the ring and pilot holes in the boards will prevent splitting. Locate these screw holes as close as possible to the inside edge of the ring to minimize the chance of splitting the tenons. With the holes drilled, remove all of the boards, apply glue, and screw the boards in place. Two support strips glued and screwed into grooves routed on the bottom of the inner ring secure the end of the middle board in the cutout. Round over the outside edge of the top and bottom of the outer ring and sand the top flush.

Shape legs with a router and template

The eight curved legs that support the tabletop are machined from 5/4 ipé. The top portion of the leg is wider than the 5/4 by 6-in. ipé boards that I had, so I glued each leg from two pieces. To ensure that the pieces matched in color and grain, I bandsawed the initial curve into the lower leg, then glued the cutoff to the wider, upper section.

After the glue set, I bandsawed away most of the scrap and machined the legs to final size using the template with a router and a flush-trimming bit. A ½-in. roundover softens the front edges of each leg. A ¼-in. roundover softens the back edges. The final step in making the legs

Tenoning the legs. *A pair of dado blades spaced with a scrap of ¾-in. plywood tenon the 1-in.-thick leg in one pass.*

Clamping jig positions the legs during glue-up. *The jig's shoulders are square, and the center is the width of the space between the legs. The legs' tenons fit into mortises routed into the base. Prefinishing the pieces prevents glue squeeze-out from staining the wood.*

is to machine the tenons that will fit into mortises in the base.

This table needs a solid base to support its weight and to prevent it from tipping over. For strength, I made the base from two pieces of 8/4 ipé joined with a glued and screwed half-lap joint. To elevate the base above any rain puddles, I glued 3⁄16-in.-thick strips of ipé under the legs.

The table legs fit into mortises machined in the base using a plunge router, bushing guides, and an MDF jig with cutouts for both mortises. Be sure the spacing between the mortises and tenons allows a 5/4 piece of ipé to fit snugly between the legs.

Three ipé struts screwed to the underside of the tabletop keep the table boards aligned and secure the top to the legs. One long strut runs below the center of the table and is sandwiched between opposite pairs of legs. Two shorter struts run parallel to the long strut and are screwed on the inside edges of the other legs. Because the struts aren't glued to the legs, the top can be removed for winter storage.

To keep the table looking like new, I brushed on two coats of Penofin penetrating oil, following the manufacturer's directions. Ipé also can be left outdoors without finish. Over time, it will weather to a gray color. □

David Bedrosian is an electrical engineer and woodworker in Waterloo, Ont., Canada.