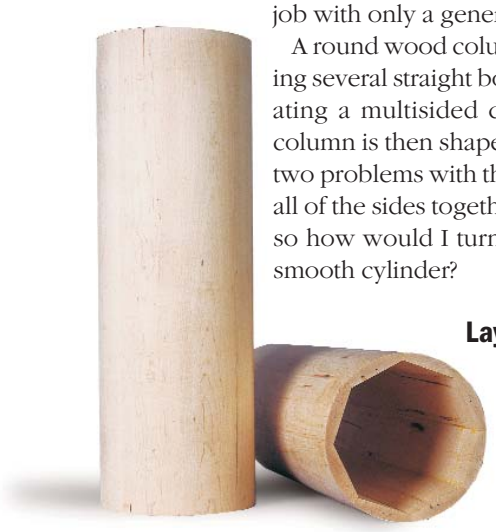
Router-Cut Columns

With two simple jigs, you can make large, wood cylinders without a lathe

BY BILL EWING

A customer recently asked me to build a round column to support a peninsula countertop that he was adding to his kitchen. The 10-in.-dia., 30-in.-high column would be capped on each end. I knew there would be some difficulty building a round column out of wood, but as I do so often, I took the job with only a general idea of how to proceed.



A round wood column is typically made by joining several straight boards together in a circle, creating a multisided column. The outside of this column is then shaped into a cylinder. I could see two problems with this project: How would I glue all of the sides together? And I do not own a lathe, so how would I turn a multisided column into a smooth cylinder?

Laying out the column

My first steps were to determine the number of sides required and to check the stock thickness. Eight sides seemed about right, and I had ¾-in.-thick maple. I have learned that time spent at the drawing board pays huge rewards in the shop, so I begin by making a scale drawing of the column cross section.

The edge bevel angle needed to join the eight sides is 22½°, and the side width measured about 4⅛ in. I took special notice of the remaining stock thickness at the completed column joints (about ⅜ in.). This seemed a little thin, but with tight-fitting joints, I felt that it would be strong enough. For a larger column, you would need either thicker wood or more sides.

Make test cuts to get the right bevel angle

Once the scale drawing is complete, it's time to make some sawdust. When bevel-ripping both sides of a board, I like to leave the edges blunt. A narrow, flat edge registers against the rip fence better than a feathery thin one. Rip nine boards: eight pieces for the column and one piece to cut up for test-fitting. Crosscut the test board into thirds, which gives you three chances to get the fence position and blade angle just right. Tilt the blade to 22½°, set the fence to leave a narrow, 1/16-in. blunt edge and rip both edges of one test board. Next, crosscut this test board into eight pieces. Test-fit these pieces, then adjust the blade angle and fence position

as necessary. By the third try, I had an octagon slightly more than 10 in. across with tight-fitting joints. Once you have the settings right, rip bevel edges in the remaining eight pieces. Because cross-cutting the finished column would be difficult, I cut the sides to length at this point.

A holding fixture ensures precise alignment during glue-up

The challenging part of making columns this way is gluing up all eight sides at once. Looking at the cross-section drawing, I reasoned that by creating a fixture to hold every other side in a fixed position, the remaining four sides would float, or slide, into place, creating tight joints (see the photos at right). The holding fixture is simply two plywood octagons separated by a 2x4. The octagons are designed to support every other column side, providing a hard registration surface for clamping. The other four sides of the octagon do not contact the remaining column sides.

To make the octagons, cut two squares from ¾-in. plywood, making the size equal to the inside distance between opposing sides of your test-piece setup. Then draw centerlines on both sides of each square. Next, cut the corners off the square so that the floating sides of the column won't contact the plywood.

Mark centerlines on the ends of four of the test pieces and clamp these to the edges of the plywood, aligning the centerlines of the plywood to the centerlines of the test pieces. Then, move the remaining four pieces into position and check the fit. If the plywood fixture ends are cut accurately, the segments will fit perfectly. Correct any discrepancy by trimming the edges or adding shims. Be sure to add or remove an equal amount of material from all four edges of both plywood pieces.

Then cut a 2x4 shorter than the column by 1½ in. Center and screw one plywood octagon to one end of the 2x4 and temporarily clamp the remaining plywood octagon to the opposite end. Make sure the registration edges of both octagons are aligned. Then place this assembly horizontally on your bench. Adjust the clamped end until its position mirrors the position of the opposite end and both ends rest on this surface without rocking. Screw the clamped end in place, and the fixture is ready to use.

Assemble the side pieces

Next, mark centerlines on both ends of four sides of the column, clamp them to the holding fixture and nudge the centerlines into alignment with the lines on the octagons. Then, place the column on its side and tape the remaining sides into place, making sure all of the ends are flush with each other.

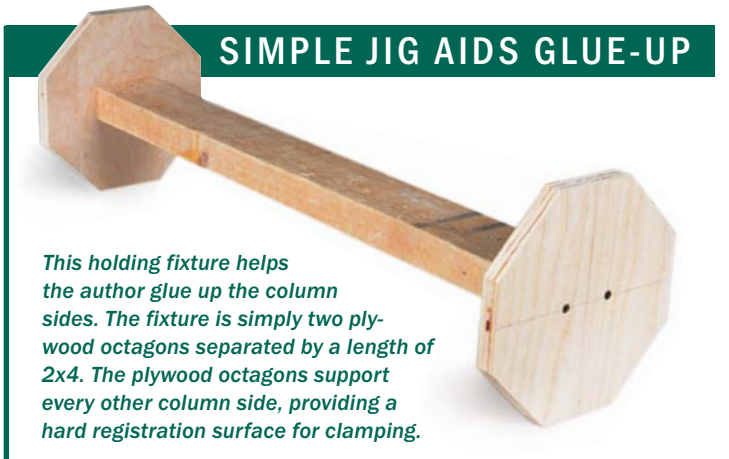
Once you're sure everything fits perfectly, remove the taped sides and glue them back into place one at a time. Begin by using tape to hold the nonclamped sides temporarily in place. Then add more clamps and wrap the assembly with rope. Gluing this many pieces at once is usually a character-building experience, but with four of the sides already secured to the fixture with clamps, this should go smoothly. After the glue has dried, remove the clamps and tap the holding fixture with a hammer until one of the plywood ends clears the column. Unscrew this end and then drive the fixture in the opposite direction until it's free.

Circle-cut the fixture support

Now to the matter of turning this eight-sided column into a cylinder: I knew I could make circular discs with a router. Because a

Photos: Dennis Preston

SIMPLE JIG AIDS GLUE-UP



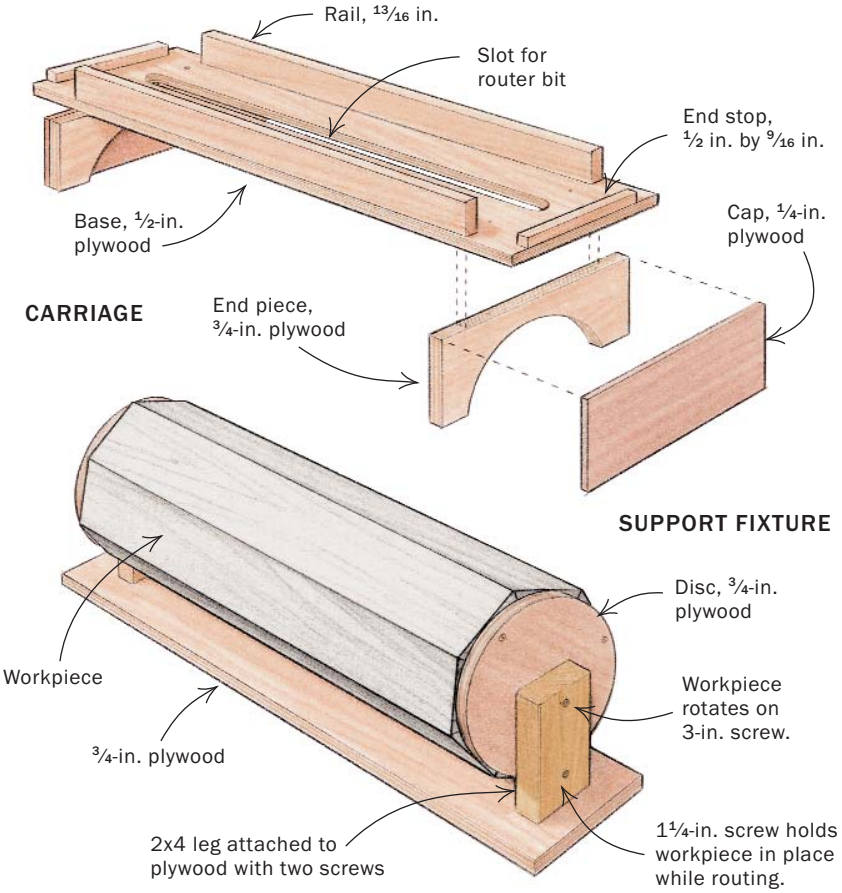
This holding fixture helps the author glue up the column sides. The fixture is simply two plywood octagons separated by a length of 2x4. The plywood octagons support every other column side, providing a hard registration surface for clamping.

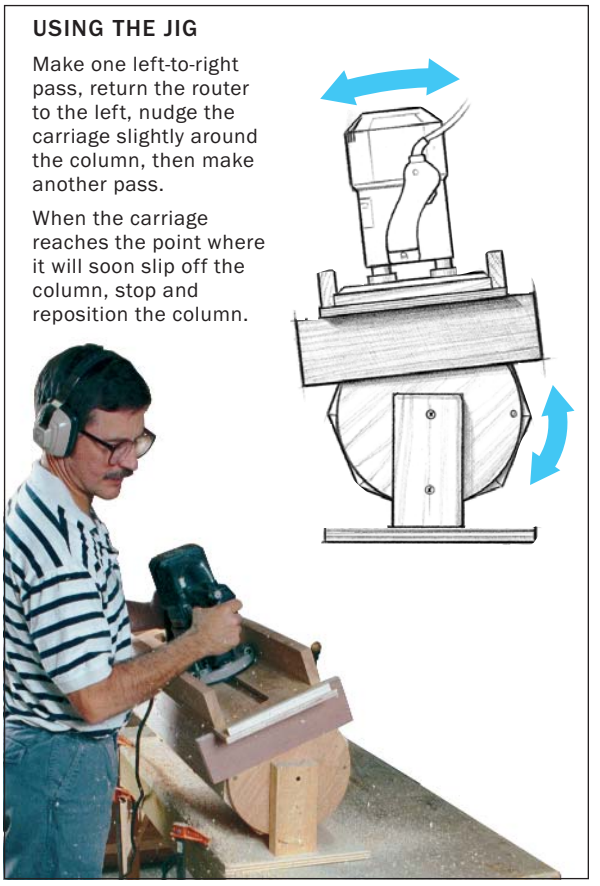
Clamp four sides. *Every other side of the column is clamped to the holding fixture. The remaining sides float into position.*

Add tape. *The tape temporarily holds the non-clamped sides in place.*

Add more clamps and tie it off. *The combination of clamps and rope holds the assembly solidly together.*

TWO-PIECE ROUTER JIG





disc is the end view of a cylinder, I guessed there would be a way of generating a cylinder using discs as a guide. With a 10-in. plywood disc mounted at each end of the column as the reference surface, a carriage could span the length of the column and ride on these discs. Traversing along the carriage, the router could then mill the faceted column into a cylinder. Use a plunge router mounted on a circle-cutting base and a 1/4-in.-dia. bit to make the two discs.

Next, make two end pieces for the carriage. The end pieces ride on the discs, so match the concave curve of the pieces to the convex curve of the discs. Use the scrap from the discs as a template to make the end pieces. Using a 1/4-in.-dia. router bit, slip a 3/4-in. bearing with a 1/4-in.-dia. hole over the bit, as described in *FWW* #75, pp. 59-61. The bearing rides against the scrap piece while the bit cuts a perfect mate for the discs.

Make the jig

With the carriage end pieces sitting on the discs, the 1/2-in. plywood base must be as close as possible to the high corners of the column. That's because the router bit must extend through the base to the finished surface of the column. This leaves the top of the jig very thin—about 1/2 in. Glue a 1/4-in. plywood cap to each end of the carriage for reinforcement.

Complete the carriage by attaching side rails and end stops for the router. The jig must be long enough that the router bit can cut the full length of the column. The exact length of the jig and position of the side rails and end stops will be determined by the size of your router base.

To hold the column in position, I built a support fixture out of 2x4s and plywood. Secure the column to the fixture by driving a long screw through each 2x4 leg and into the center of each disc. To keep the column from rotating during the routing process, drive a screw through one 2x4 leg and into the disc near its outer edge. This screw is loosened to allow gross rotation of the column between router cuts and then retightened, locking it in place.

Round the column one pass at a time

Place the carriage on the column for shaping. The snug, friction fit between the discs and the end pieces of the carriage holds the jig together. For a smooth finish, use a 1-in.-dia. bottom-cleaning bit. Lower the bit until it just clears the discs and make one left-to-right pass, return the router to the left, nudge the carriage slightly around the column, then make another pass. The more passes you make, the less sanding will be required. When the carriage reaches the point where it will soon slip off the column, stop and reposition the column. Continue in this manner around the column, incrementally bumping the carriage over to cut the next pass, then rotate the column, progressively reducing the eight-sided column to a cylinder. Once the column is round, put the carriage aside and sand the column smooth while it's still on the support fixture. □

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Drawings this page: Bob La Pointe

Making tapered columns

A tapered column requires several modifications to the basic procedure: ripping tapered sides, making a different glue-up fixture and fitting two different diameter discs and jig ends.

I use a simple, fixed-angle plywood jig on my tablesaw first to rip a straight taper on all of the sides, then to bevel the edges (see the drawings below). Begin by ripping the test side ¼ in. wider than the other sides. Rip the remaining eight sides slightly oversized. With the rip fence set, use the tapering jig and cut one edge of each piece. Now, nail the test-piece offcut to the tapering jig. This ensures that the second edge of each side will be cut to the identical angle. Placing the tapered edge against the jig, adjust the rip fence and cut the second edge on all of pieces.

On a tapered column, plywood forms provide uniform clamping pressure. *Tap them in place with a hammer.*

Tilt the saw arbor. By again using eight sides, the bevel angle remains at 22½°. Using the tapering jig (offcut piece still attached), position the work against the jig so that the edge being cut is parallel to the blade. Adjust the fence and cut the bevel on one edge of each piece.

Next, flip the tapering jig end for end, but don't move the fence. Rotate the sides 180° and cut the second bevel in each piece. When pushing the jig and working through the saw, you want to push on the work, not the jig.

After all of the sides have been tapered and beveled, the next step is the glue-up and clamping operation. Usually, clamping any object with tapered sides poses a problem. In this case, however, the sloping sides are an advantage because you won't need an internal holding fixture for the glue-up. Begin by dry-assembling the column using tape to hold the sides together. An extra pair of hands is helpful here.

Next, measure the outside distance across two opposing sides of the column at 8-in. to 10-in. intervals along the length of the column. Using these measurements, draw the corresponding octagon on a piece of ½-in. plywood. Be sure to leave at least 2 in. of material around the outside edges for strength. Now, cut out these shapes and slide the plywood forms over the column.

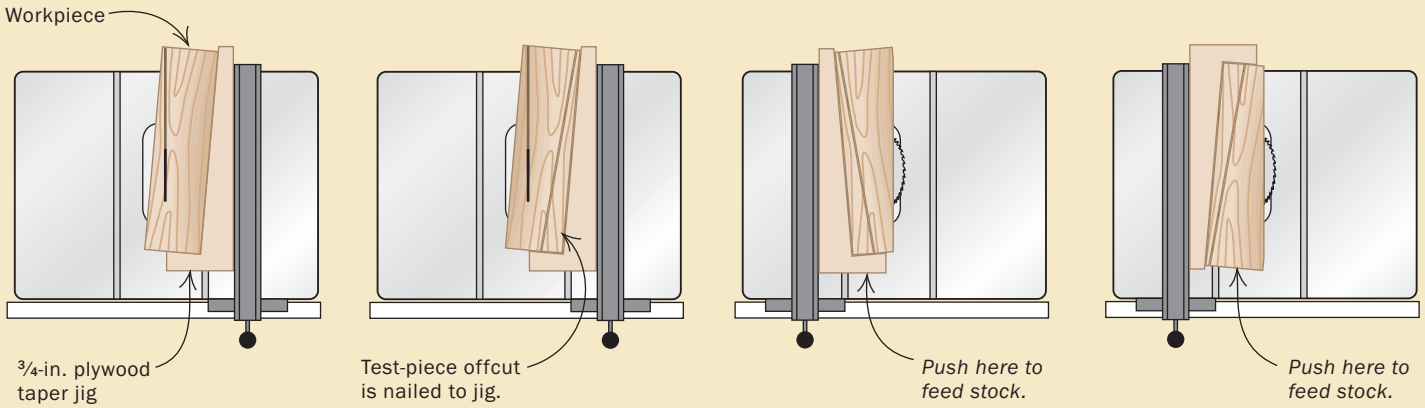
When everything fits properly, remove the plywood forms and tape. Now, apply glue to the edges and tape the sides. Slip the largest form over the column and tap it down. Be sure that the sides are properly aligned during this process. Tapping these forms down with a hammer generates a great deal of clamping pressure, and it forces the column into the correct shape. Repeat this procedure with the remaining plywood forms. For additional clamping pressure, you can place bar clamps across the ends of the column.

After the glue has dried, remove the forms and clamps. Make an appropriately sized disc and corresponding carriage end for each end of the column.

The rest of the jig is built the same as it was for cylindrical columns. The carriage will sit at a slight angle because of the taper. This may look awkward, but it won't affect the performance of the jig. Complete the routing process as described for the cylindrical columns.—*E.W.*

TAPER AND BEVEL THE SIDE PIECES

The author uses a two-step procedure on his right-tilting tablesaw to cut the side pieces for a tapered column. Separating the taper cutting from the beveling operation allows more leeway for achieving tight-fitting joints.



1. Rip one edge of all pieces. Save offcut from test piece.

2. Nail test-piece offcut to jig. Flip work over, reset fence and rip second edge on all pieces.

3. Reset fence, tilt blade and bevel one edge on all pieces.

4. Don't move fence. Flip jig end for end, rotate stock and bevel second edge.

Drawings this page: Michael Pekovich