

MORTISE AND TENON

By Scott Gibson

I have a lot of confidence in a traditional mortise-and-tenon door. The wood-to-wood contact is substantial, meaning there's a large glue area, and the joints are highly resistant to racking. A door with tight-fitting joints is extremely durable.

The process is more time-consuming than making cope-and-stick joints with a router, and it isn't as well suited to making doors on a job site. That said, the work goes surprisingly fast once the machine settings have been dialed in. For tooling, I use a tablesaw and a mortising machine in addition to a few basic hand tools. Mortises could be cut with a drill press or even a portable drill plus a chisel, but the mortising machine is faster and more accurate.



It may be overkill to make doors the way I do, but it wouldn't be the first time I overbuilt something.

The advantage I see is that with one setup, mortise-and-tenon joinery can be used to make all the frame-and-panel parts, face frames, and doors for a kitchen's worth of cabinets. It takes some fiddling to get the setup, but once that's done, many pieces can be run off quickly.

Despite his recent conversion to pocket screws in other aspects of cabinetmaking, contributing writer Scott Gibson still uses mortise-and-tenon joinery for his cabinet doors. He works mostly in his shop, a short walk from his house in East Waterboro, Maine.

SET UP



Make a test piece first for setup.

The one fixed dimension of the mortise and tenon is determined by the size of the mortiser chisel, so the tenon and panel groove are sized to the mortise. A test mortise is cut with a benchtop mortiser fitted with a 1/4-in. bit. Measuring the width of the mortise with a set of dial calipers is an accurate way to determine the necessary thickness of the tenon and the panel groove.



COPE AND STICK

By Joseph Lanza

I don't know if it qualifies yet as traditional, but millwork factories were producing cope-and-stick joinery a hundred years ago. If you have a table-mounted router, cope-and-stick bits offer a quick, accurate way to make cabinet doors without a big investment.

With a glued-in plywood panel, cope-and-stick doors are extremely strong. Solid-panel doors can be made stronger by adding interior rails or stiles, but for larger doors, cope and stick may not be the best choice, unless the joints are reinforced with slip tenons or dowels. The extra work required might tip me in favor of using mortises and tenons for larger doors.



Although maybe not the best choice for period reproductions, cope-and-stick doors are a good option for jobs that don't require the structural or emotional benefits of mortise-and-tenon joinery. Most of the modern solid-wood cabinet doors in this country are made with a simple cope-and-stick joint, and the vast majority are holding up just fine.

Joseph Lanza is an architect, builder, and cabinetmaker who makes doors with cope-and-stick router bits mounted in a router table. More often than not, you'll find him on a job site. He lives in Duxbury, Mass.

SET UP



A two-bit approach. Cope-and-stick router bits are available as single arbors with interchangeable cutters or in sets of dedicated cope and stick bits. The two-bit sets are more accurate and take much less time to set up. (The Amana set used here costs about \$120 and also can be used to make interior passage doors.) Many sets include thin brass or steel shims that can be inserted between the cutters to match the relative size of the profile to the thickness of the stock.



GROOVE STILES AND RAILS



Two passes cut the panel groove. Although the groove is often cut with a dado stack, it also can be cut with a single tablesaw blade. Because the panel groove measures $\frac{1}{4}$ in. wide, it can be cut by positioning the fence so that the blade cuts just to one side of the centerline. Registered from either side of the stock, the blade cuts a centered groove in two passes.

MORTISE STILES ONLY



Dialing in the mortises. After the panel groove is cut, the mortiser is set up to cut on center and to the correct depth. Here, the mortises were cut to $1\frac{5}{16}$ in. deep to make room for glue and a $\frac{1}{4}$ -in.-long tenon.



COPE RAIL ENDS ONLY



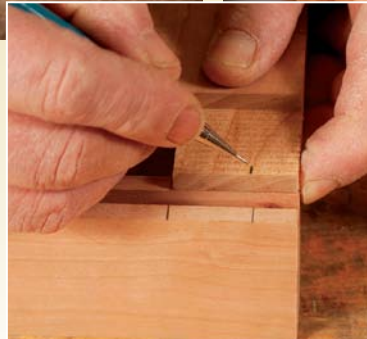
Cut the cope first to reduce tearout. After chucking the cope bit into the router, adjust the bit height so that the profile is centered in the stock, and check with a test piece. The opening in the fence should be just large enough to allow the bit to spin without hitting the fence. With a straightedge, check that the bearing is in line with the fence. When cutting, use a backing block to keep the stock square to the bit and to prevent the grain from blowing out at the back of the piece. Cope all rail ends.



TENON THE RAILS



Tenons are crosscut on the tablesaw. Using either a single blade or a dado stack, tenons are cut by first registering the fence at a distance from the blade equal to the length of the tenon. The first pass will cut the cheeks, so it's important that the miter gauge be square to the blade. Moving the stock away from the fence and making repeated passes removes the waste. It's a good idea to check the setup on scrap first.



Check the fit, and adjust if needed. Each joint should be tested to ensure a tight fit before assembly. It's best if the tenon needs a few swipes with a plane to fit, rather than having to add a shim.



STICK THE STILES AND RAILS

RABBET THE PANEL



Switch to the stick bit. After switching bits, align the middle cutter with the stub tenon on the coped end. Run a test piece to make sure the mating cope and stick align. Run all rails and stiles.



Prep the panel. Dry-fit the rails and stiles, then determine the panel size. Because plywood won't move seasonally, the panel can be cut within $\frac{1}{16}$ in. of the actual size. The router table is set up with a straight or dado bit to cut the $\frac{1}{4}$ -in. by $\frac{1}{2}$ -in. rabbet on the back.

RABBET THE PANEL



Cut and rabbet the panel. Once the frame is ready to be assembled, the panel can be cut. In this case, 1/2-in. plywood was chosen for a more substantial door. After the panel was cut to size, a rabbet was routed along its back edge.



ASSEMBLE THE DOOR



The last step is assembly. After a thin, even coat of glue is spread on the mating parts, the rails and one stile are joined. Next, the panel is inserted into the groove, the second stile is attached, and the door is clamped. Measure diagonals to make sure the door stays square in the clamps.

ASSEMBLE THE DOOR



Assembly time. It's always a good idea to have a dry run when gluing up a door. If everything fits tightly, apply glue and assemble the rails, stiles, and panel. Clamp at both ends near the rails, and check that the door isn't curling because of too much clamp pressure. Parts that slide out of alignment under pressure can be adjusted back into place with a dead-blow mallet. Finally, check the diagonals to make sure the door is square.