Super-strong 3-way miter

COMBINATION OF HAND AND POWER TOOLS MAKES IT SURPRISINGLY STRAIGHTFORWARD

BY ANDREW HUNTER

At first glance, this double-tenoned lapping miter joint might seem as complicated as its name. I am sure some of the Chinese craftsmen using the joint more than 500 years ago puzzled over it, too. But once you have taken the time to create an accurate layout, this intricate joint can be made quickly and precisely.

In China it is known as the rice dumpling joint, after the three-way mitered fold of a dumpling, and has been in use since the Ming dynasty (1368–1644). Since its early history, Chinese furniture has been constructed predominantly with miter joints. In addition to its strength, mitered joinery lets shaped profiles meet seamlessly. Curves can flow into curves without the need for a more difficult cope.

This oak cabinet has 16 separate corners all with this mitered joint. For this article, I'm demonstrating one joint made from start to finish. However, it's worth mentioning that because the three parts of each joint are so different, in an actual project I lay out all the like pieces, move on to the next set of like pieces, and then lay out the last set. I do the same with the construction. I cut all the stiles first, then I cut all the mortise-only rails (side rail, above), and then the rails with one tenon and one mortise (front rail, above).

Whether the tenons are through- or concealed is a matter of personal preference. I use through-tenons. Also, because there is so much mechanical strength to this joint, I am able to leave it unglued, which allows for any repairs in years to come. But feel free to lock your joints with glue.

SEE IT IN MOTION

Strength and beauty. *Hunter cut the three-way miter 16 times to create all of the corners in his oak dressing cabinet (right). The joint lends great rigidity to the piece, which consists of two stacked cases.*

The key to a successful three-way miter joint is an accurate layout. It is important to begin with straight, square stock and to really take the time to draw out every line accurately. Once you are confident your layout is perfect, you can breathe easy. Carefully excavating to these lines should leave you with little or no fitting.

Andrew Hunter designs and builds custom furniture in his studio in Accord, N.Y.

Photo, this page (bottom right): John Waldie

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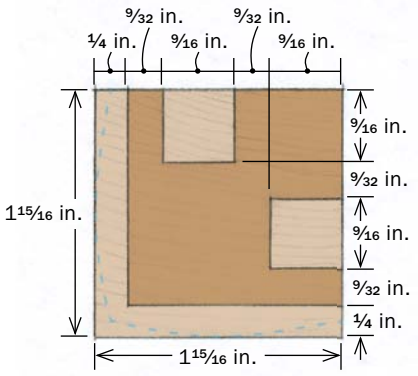
Precise layout is key

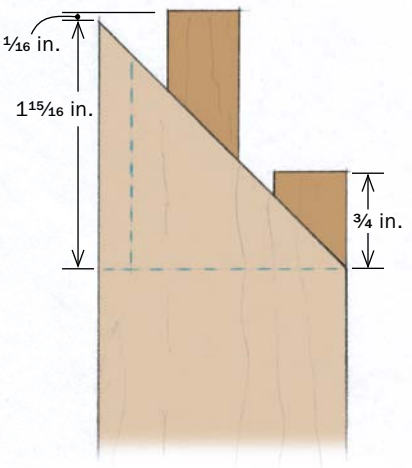
Begin by labeling the outside faces of each piece and using them exclusively as reference surfaces for locating the layout lines. Hunter lays out the stile first, then uses an adjustable square to transfer most of the layout lines to the two rails.

Mark the bottom shoulders and 45° miters first. *Start the miters about 1/16 in. from the end of the workpiece to let the tenons protrude.*

STILE



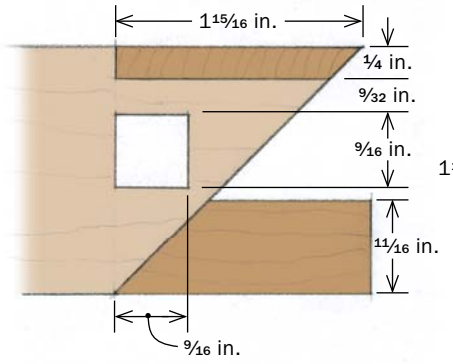
TOP VIEW



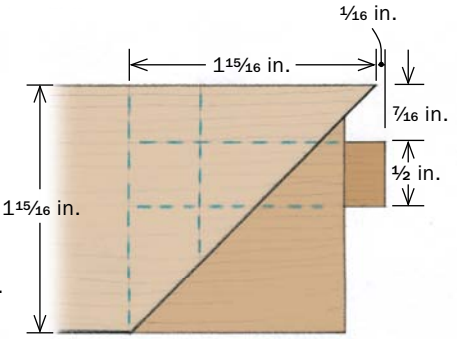
FACE VIEW

Two tenons top the stile. *On the end, lay out four pairs of perpendicular lines at equal distances from each reference face. Two of the resulting squares will become tenons. Mark the waste tenons as shown and carry the lines down to the baseline on each inside face.*

FRONT RAIL



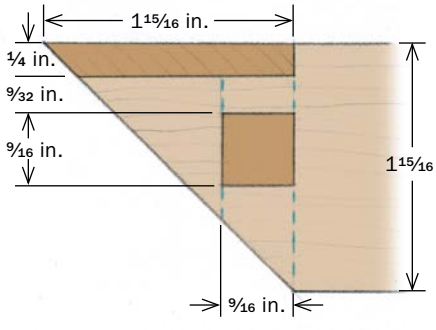
BOTTOM VIEW



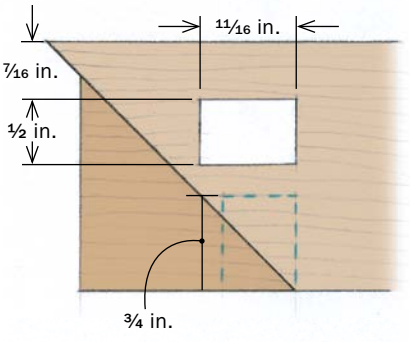
FACE VIEW

Front rail is next. *This piece has a vertical through-mortise that accepts the long tenon from the stile. A beefier horizontal tenon goes through the second rail. Transfer most of the layout from the stile using a square, but mark directly from the stile to locate the mortise wall opposite the baseline.*

SIDE RAIL



BOTTOM VIEW



FACE VIEW

Side rail gets mortises only. *A stopped mortise underneath accepts the short tenon from the stile, while a rectangular through-mortise accommodates the long tenon from the front rail.*

Drawings and detail photos of joints: Kelly J. Dunton

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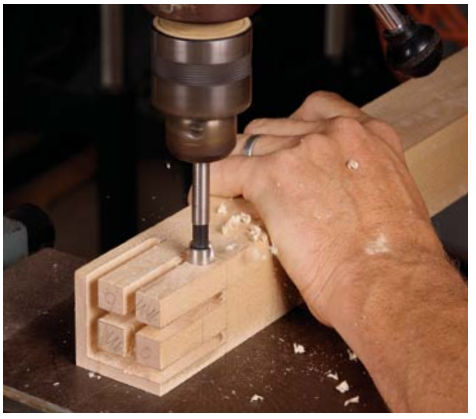
Make the stile

Some slick hand-tool and machine tips will get rid of the unwanted material and leave you with two perfect miters and two tenons.

Magic at the router table. *Using a ¼-in. spiral bit, work slowly (about one-third-depth intervals) to clean out between the layout lines. Mark the bit's location on the fence so you can eyeball when to stop the cut before the bottom shoulder line. After an initial rough pass, go back and clean up right to the pencil line. This step will leave you with four perfect tenons, though you only need two of them.*



Remove the front tenon. *Use a Forstner bit in the drill press to remove the section of the tenon that you wouldn't be able to reach with a handsaw.*

Follow up with a handsaw. *Carefully cut off what remains of the front tenon.*

Get rid of the back tenon. *With the front tenon gone, you have access to the back one. Drill between the two side tenons to remove it. Clean up the bottom of the joint with a chisel.*

Outside miters are easy now. *Cut the two mitered shoulders with a handsaw, then shave right to the line with a shoulder plane.*

Cut one tenon short. *Finish by cutting one of the tenons short to accommodate the tenon that will come in from the rail.*

Photos, except where noted: Anissa Kapsales

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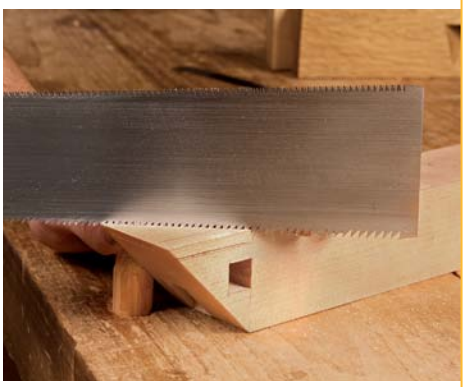
Tackle the rail without tenons

Of the two rails, the side one has no tenons, and Hunter likes to tackle that next. This piece is the most straightforward of the three.

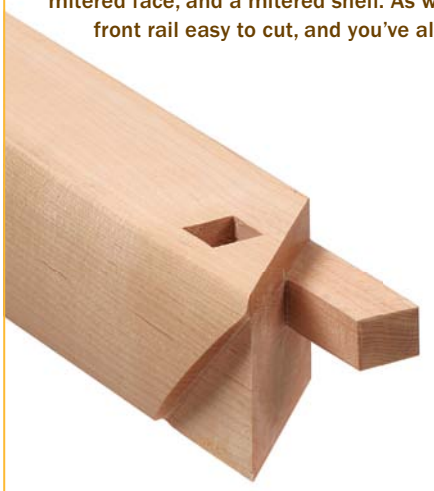
Two mortises and a miter. *Use a drill press to remove the bulk of the mortises, and then chop to the lines with a chisel. Then use a chopsaw to cut the miter. Hunter cuts just outside the layout lines and then shaves right to the line with a handplane or chisel.*

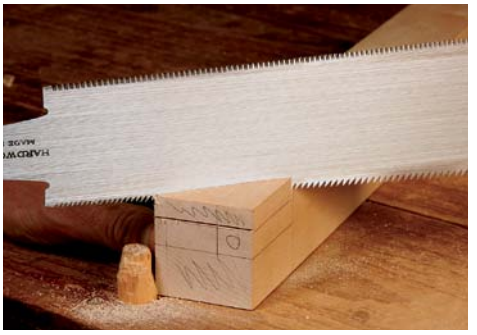


Cut the mitered shelf. *Use a handsaw to cut the ¼-in.-deep shelf that will accommodate the mitered laps of the stile. Clean it up with a shoulder plane.*

Final rail combines all the elements

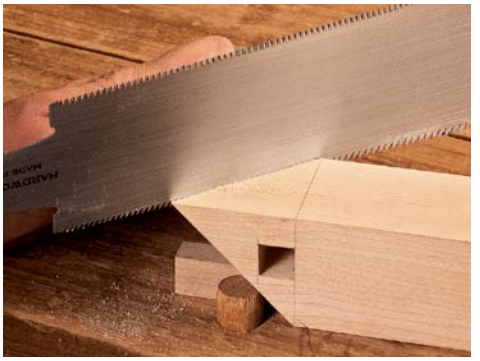
This piece combines elements of the other two. It has one long tenon, one through-mortise, a mitered face, and a mitered shelf. As with the other two parts of the joint, Hunter makes the front rail easy to cut, and you've already done all of these moves on the first two pieces.





Mortise first, then the tenon. *Drill the mortise and square it with a chisel, then saw away the sides to reveal the tenon's cheeks. Use a shoulder plane to clean those faces to the line.*

Finish up the tenon. *Again with a handsaw followed by a chisel, cut away the remaining waste to leave the tenon.*

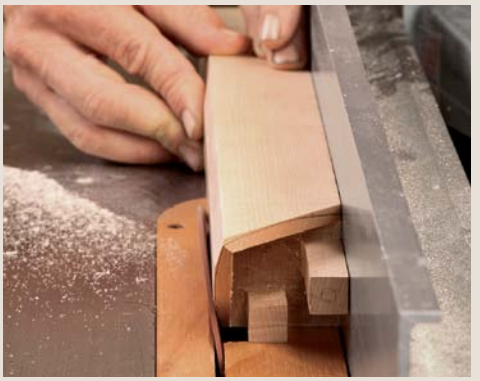


Add the shelf. *Like the other rail, this one gets a mitered shelf that holds the mitered laps of the stile.*

SHAPING IS THE FINAL TOUCH

With the joinery complete, you can shape the outside faces of the joint. This is where the genius of this joint becomes so apparent. Superior strength aside, you can seamlessly transition any profiling you do from one face of this joint into the next.

Creating a profile. *Cut the desired profile on a piece of scrap, then transfer the shape to the stile. Mitering the ends of the scrap makes the transfer easy.*



Rough the shape at the tablesaw. *Rip the facets first, then fine-tune the shape with a handplane. Reassemble the joint and trace the profile from the stile onto the rails.*

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