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though the back assembly of the Chippendale chair (see pp. 50-59) presents the bulk of the chair's challenges, the compound-angle tenons where the rear legs meet the side seat rails can be a sizable hurdle, too. Don't be intimidated. By using two straightforward, effective jigs-one helping with layout and the other to hold the workpieces properly at the tablesaw-you'll be able to tackle these tenons. All that's left at the end will be a little cleanup by hand.

## Compound-angle tenons

## TWO INGENIOUS JIGS SIMPLIFY THE PROCESS



Seen from the back, the legs on a Chippendale chair tilt in at the bottom. This is the cant angle.

## TWICE-TWISTED TENONS

The side seat rails' rear tenons have two angles at play: the cant angle of the leg and the trapezoid angle of the seat frame. That's a lot to juggle. So even though Brown cuts these by machine, he still takes the time to carefully lay them out on the stock, minimizing the chance of cutting the wrong tenon on the wrong rail.



## Jig for tenon layout

Scribing the tenons now can spare you a costly mistake at the tablesaw.

Lay out the tenon shoulders. Start by knifing the shoulder on the inside face of the side seat rail. Then, using the end of the layout jig, knife across the rail's top and bottom edges. Complete the shoulder layout by squaring a knife line across the outside face.

TRAPEZOID ANGLE JIG


SIDE VIEW

Mark the cheeks and ends. Use the long angled edge of the jig to lay out the tenon cheeks. Start on the edges of the rail and use the mortises in the chair legs to determine where the cheeks intersect the shoulders. With the cheeks laid out on the edges, use a straightedge to connect those lines and lay out the end of the tenon.


To lay out the tenons, I turn to a bare-bones jig, a piece of $1 / 4$-in. plywood cut to the trapezoid angle of the seat frame and glued into a poplar beam. I use the end of the plywood to lay out the shoulders, and its long angled edge to lay out the cheeks. I can lay out both cheeks just by sliding the poplar beam up and down the stock. This jig may sound superfluous, but it isn't. If you've ever laid out angled tenon cheeks with a bevel gauge, you know it can be a balancing act. This jig takes care of that problem. It also comes in handy when making the tenoning jig.
Once you've laid out the tenons, it's time to make the tenoning jig, which you'll use to cut the cheeks. The jig is a wedge sandwiched between two fences and attached to a backer board. Start the wedge by milling a block of solid wood to the same width as the seat rails. Then tilt the tablesaw blade

END VIEW


## master class

## Jig for compound cutting




Determine the cant angle. The joint needs to account for the seat's trapezoid angle and the leg's cant angle. Set a bevel gauge to the cant angle, measuring from the chair itself.


Tablesaw setup
requires two
angles. To cut the wedge to the proper angle, set the blade tilt using both the layout jig and bevel gauge.
2. Use layout jig to hold the bevel gauge at the trapezoidal angle.


Rip your wedge. For safety, Brown bevels the wedge from an overlength blank. He leaves it long until it is fixed to the backer block, ensuring that it and the backer are flush top and bottom.

Attach the wedge to an MDF backer. The angled side of the wedge goes against the backer, which, for safety, should be about as wide as the height of your tablesaw fence. Brown leaves the wedge overlong at first so he can cut it and the MDF to size later.

Glue on the fences. Because you milled the wedge with the rails, these $1 / 4$-in. plywood fences will hold the rails with a tight press-fit.

and rip one wide face of the block. To determine the correct blade tilt for the rip, set a bevel gauge to the cant angle. But instead of placing the gauge perpendicular to the blade as normal to set the tilt, skew the body of the gauge to the trapezoid angle. You can use the layout jig to help with this.
Now screw the wedge to the MDF backer, which will ride along the tablesaw fence. Be sure the angled face of the wedge is against the backer. Then glue plywood fences to either side of the wedge. With the jig complete, it's time to cut the cheeks. To set the blade tilt, adjust a bevel gauge to the trapezoid angle. But again you won't hold the gauge at $90^{\circ}$ to the blade. Instead, turn it from perpendicular by the amount of the cant angle. You can do this by holding the body of the gauge against the side of


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## Cut the tenons

The jig will help you cut tenons in both rails by simply flipping it over.


Tilt means two angles again. This time, set the bevel gauge to the trapezoid angle, then place it against the wedged jig so it is presented to the blade at the adjusted cant angle.



Slide the fence over to cut the second cheek. Lower the blade for the second cut to avoid cutting past the shoulder.


Trim the shoulders. Tilt the blade to the trapezoid angle and lower it to cut the shallowest part of the shoulder. Cut one shoulder on both tenons, then shift the fence to the other side of the blade to cut the second ones.

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Cleanup
The chair's compound angles mean you'll need a few more steps to get surfaces neat and flush.

Mark the overhang on the end... Because the leg cants but the side seat rail is plumb, a thin triangle of end grain should be hanging out from the leg.
... and edge. Using a straightedge, pencil a line to mark the overhang from the back end to the front corner of the rail. This will smooth the transition from the plumb front leg to the canted rear leg.

the tenoning jig. Cut the first cheek on one rail, then turn the tenoning jig upside down and cut the first cheek on the other rail. After resetting the fence, cut the second cheeks on both tenons.
For the shoulders, set the tablesaw blade to the trapezoid angle and lower it so it cuts only at the shallowest part of the tenon under each cheek. You'll need to shift the fence to the other side of the blade to cut one shoulder on each tenon. Then finish up with a chisel.

When the tenons have been sawn to width and fitted, a bit of the rail will overhang the leg, since the rail is plumb while the leg is angled. You can fix this after gluing the side and front rails to the front legs. Using a handplane, shape the outside face of the side rail to a gentle wind. The difference is usually so subtle that most people see the rail as flat.

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Time to wind.
Remove the overhang with a sharp plane and sure strokes. The wind is so subtle that it appears flat.



