

Quick and Accurate Mortises

A plunge router and router
box make this method
simplicity itself

BY BOB VAN DYKE

I have cut more mortises using a plunge router and a router box than with any other method, including a hollow-chisel mortiser. Think of all the ways there are to cut mortises in a table leg. They can be chopped by hand with a mortising chisel and a mallet, or you can drill out the mortise and pare to your layout lines. A hollow-chisel mortiser works great, but mortises are the only thing it can do. A router table with a fence is certainly a viable method, or you can always use trained termites. A plunge router with a router box is hands down one of the easiest and most accurate methods that I have used. In my school, I figure we have made over 8,000 mortises this way. And the same router can also make moldings, roundovers, curves, and so much more. Try doing a Roman ogee with a hollow-chisel mortiser!

Making the box

The router box is a basic affair. For the base, glue and screw two pieces of $\frac{3}{4}$ -in. plywood to-

gether, then straighten one edge and rip the other edge parallel. The sides are plywood screwed to the base. The top edges of both sides must be the same height above the surface of the base, or your mortises won't be square to the face of the workpiece.

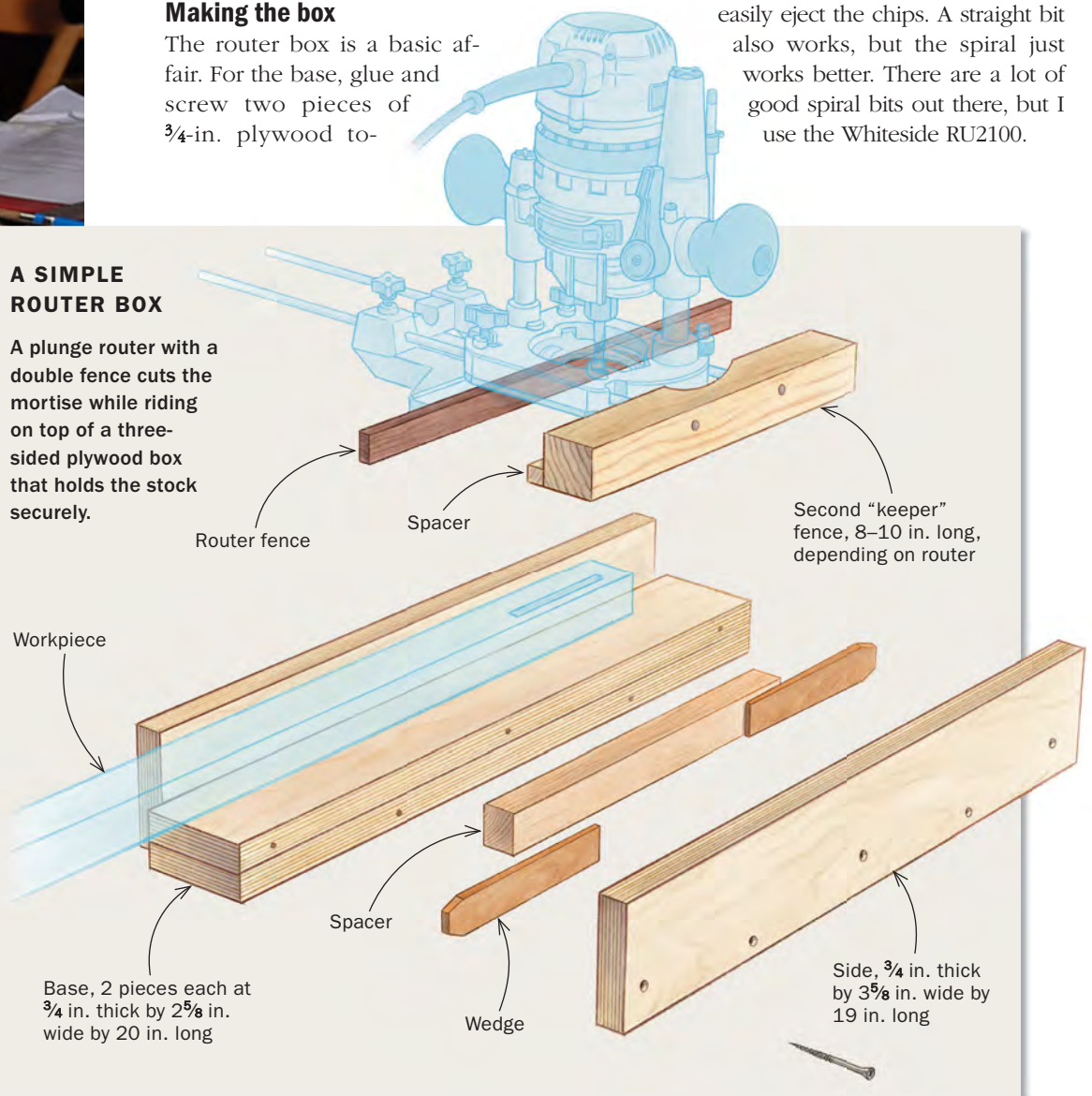
I make the box large enough to accommodate a range of different-size legs. The height of the sides is $2\frac{1}{8}$ in. above the base ($\frac{1}{8}$ in. higher than the biggest leg I would do in this jig) and the width between the sides is around $2\frac{5}{8}$ in., wide enough to fit a $1\frac{1}{2}$ -in.-square leg, plus a $\frac{7}{8}$ -in. spacer and a few wedges to hold it. Use a thinner spacer when mortising bigger legs. The exact length of the box is not important.

The bit

I prefer a solid carbide spiral bit specifically designed for plunging. The spiral flutes easily eject the chips. A straight bit also works, but the spiral just works better. There are a lot of good spiral bits out there, but I use the Whiteside RU2100.

A SIMPLE ROUTER BOX

A plunge router with a double fence cuts the mortise while riding on top of a three-sided plywood box that holds the stock securely.



Building the router box

Construction doesn't get much easier than this: four pieces of plywood glued, clamped, and screwed together.

Predrill for screws. Using a countersink bit, predrill the holes in the side pieces of the box.



Ready to glue. Spread glue on the edges of the bottom piece (two ganged pieces of 3/4-in. plywood).



Tack them together. Use finish nails to tack the sides to the bottom so they won't shift.



Clamp and screw. Clamp the pieces tightly together, and then screw them in place.

Begin with a setup leg

To get a feel for laying out and using the box, mill a piece the same width and thickness as the piece you'll mortise. The length doesn't matter.

Lay out the sides of the mortise. Using a square, draw a line for the first side of the mortise. Then place a spacer, the thickness of your mortise, against the square and draw a line to mark out the other side of the mortise.



Tips on depth setting, climb cuts, and a keeper fence

I usually set the bit's final depth by plunging the bit on the turned-off router to match a layout line I have marked on the end of the setup leg. This is the simplest method, but you can also plunge the router so the bit just touches the work surface and then insert a spacer equal to the depth of the mortise between the turret stop and the plunge depth bar. Don't forget to lock the bar.

To avoid making a climb cut, always set the router fence on the right side and only cut while pushing the router away from you. If you pull the router toward you while the fence is on the right side, you will be making a climb cut, a potentially dangerous situation that will almost always result in a ruined mortise.

To further ensure success, I like to add a "keeper" fence on the left side, which helps keep the router in place. The fence is easily made with scrap stock around 1 in. to 1½ in. thick and two 18-in. steel rods, available from any hardware store. These longer rods replace the original rods that came with the router fence you are



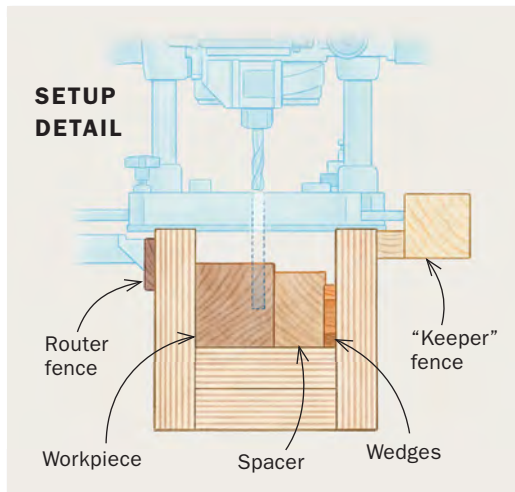
Lay out the top and bottom of the mortise. Line up the top edge of an apron with the top of the test leg and set your square on the bottom edge of the apron. Butt a spacer to the square, and strike a line to represent the bottom of the mortise. Use the square to mark the top of the mortise if it's a straight-up mortise or the bottom of the haunch if it's haunched.



Set the test piece in place. Put your setup leg into the box against the right side. Insert a spacer to the left of the leg and use two wedges between the spacer and the left side of the box to hold the leg in place.

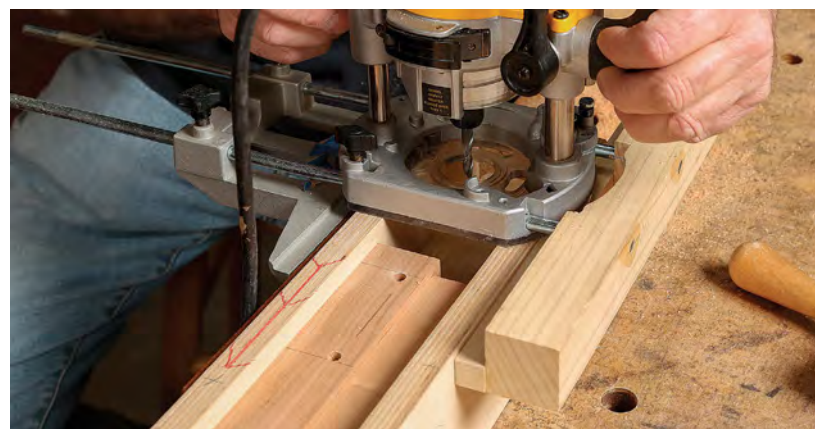
Time to cut a real mortise

Once you've tested the setup piece, put the real leg into the mortise box and cut the mortise.



Adjust the fence. Place the router, with its primary fence and keeper fence, on the top of the router box so the bit lines up with the mortise. Secure the fences. With a fence on each side, the router is effectively trapped, and won't stray as you cut.

Set the depth. An easy way to set the depth of cut is to draw a line on the end of the leg. With the leg in place and the router turned off and resting on the box sides, plunge the bit to the layout line and lock the depth stop.



Plunge, plunge, and back and forth. Van Dyke's preferred cutting method is to make full-depth plunge cuts at the start and end of the mortise, and then make progressively deeper passes the length of the mortise until he reaches full depth. His pro tip: Don't change the router depth at the end of each pass. Instead, first slide the router back to the beginning. This pass will clear any chips without cutting wood.

using. They must be the same diameter as the original rods. Drill holes for them in the keeper fence spaced to match your router, then epoxy them into the keeper fence.

Two mortising methods

Two methods of cutting the mortise work equally well. The first is to plunge the bit down full depth—and retract it straight up—at the beginning and then at the end of the laid-out mortise. Now return to the beginning and make a series of overlapping full-depth plunges, down and up. After the last plunge, retract the router bit, go back to the start, and plunge the bit full depth again. Keeping the bit at full depth and pushing forward, rout the length of the mortise. Retract the router and turn it off.

The other method, which I use more frequently, starts the same way: Plunge the router full depth to define the beginning and end of the cut. Now, go back to the end closest to you and make a series of progressively deeper passes (usually around $\frac{1}{8}$ in. to $\frac{3}{16}$ in. at a time) the length of the mortise, always pushing the router away from you, until the final depth is reached.

I find that using the different turret depth stops to control the progressively deeper cuts is laborious and unnecessary. It is easy enough to make these cuts by feel. You can tell you are taking too deep a cut if the noise from the router increases dramatically, the bit chatters, and the



Cut a haunched mortise

Often used in leg-to-apron joints, the haunched mortise has a shallow section at the top end that adds twisting resistance without overly weakening the leg. It's easily cut on the router box.



Turret stop sets depth. Once you cut the full mortise, you can focus on the haunch. The only thing you need to change on the router is the depth of cut.



Cutting the haunch is simple. After cutting the main mortise, you can cut the haunch in one or two passes. Depending on which mortise you are cutting, you'll start from the end of the leg and cut toward the main mortise, or start in the main mortise and cut to the end of the leg.

surface is noticeably rougher. Usually, the only turret depth stop I use is for the final depth.

Haunched mortises

I do use an intermediate turret stop when making a mortise with two different depths, as is the case when making a haunched mortise. In this case I set the full depth of the mortise using the deepest turret setting and set one of the adjustable turret stops to the desired haunch depth. The exact haunch depth is usually not critical—a typical leg mortise can have a haunch anywhere between $\frac{1}{8}$ in. and $\frac{1}{4}$ in. deep. If you run the full-depth mortise before running the haunch, your layout line for the haunch will not be erased.



Check your depths. Before you remove the leg, use a metal ruler inside the mortise to double check the depth of the main mortise and the haunch.

Final touches

After the machine work, I square the mortise to my original layout line. The bottom layout line determines where the top edge of the table apron will sit. Making an accurate chisel cut ensures this. If you round over the tenon instead of squaring the mortise, you won't have an accurate reference. What if you stopped the router cut too early? A chisel cut on the layout line is a simple way to ensure consistency.

You will find this method of making mortises very accurate and straightforward. The best part is that you don't need to buy another machine! □



Chisel the mortise square. Once you rout the haunch, use a chisel the same width as the mortise to clean up the mortise, making sure to cut the ends straight up and down.

Contributing editor Bob Van Dyke runs the Connecticut Valley School of Woodworking.