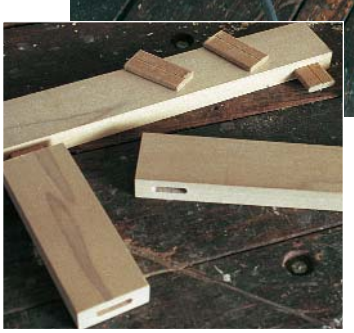
Shop-Built Horizontal Mortiser

BY JOHN F. MATOUSEK



Using a router and two sliding tables, this homemade setup is a versatile joint-making machine

My wife and I had just transformed our basement into a sitting area, home office, alcove and bar, but it was clear to me that we weren't finished. I envisioned three major furniture projects I'd have to complete. We needed a built-in storage cabinet in the sitting area for a television and VCR; base cabinets in the office for a computer, a printer, a copier and a fax machine; and shelf units in the alcove for books, albums and assorted art objects. I planned to build the shelf units in a Craftsman style, based on some bookcases I'd seen in an article by C. Michael Vogt (*FWW* #110, pp. 58-60). I could foresee dozens—if not hundreds—of mortise-and-tenon joints, and I began to question my plan to tackle all of these projects.

I had read an article about mortise-and-loose-tenon joints, and I remembered that loose tenons are simple to make. If I could speed up the mortising process, I could complete my three projects in a reasonable amount of time. So I began to design a machine to make mortises.

The machine is designed to make accurate cuts

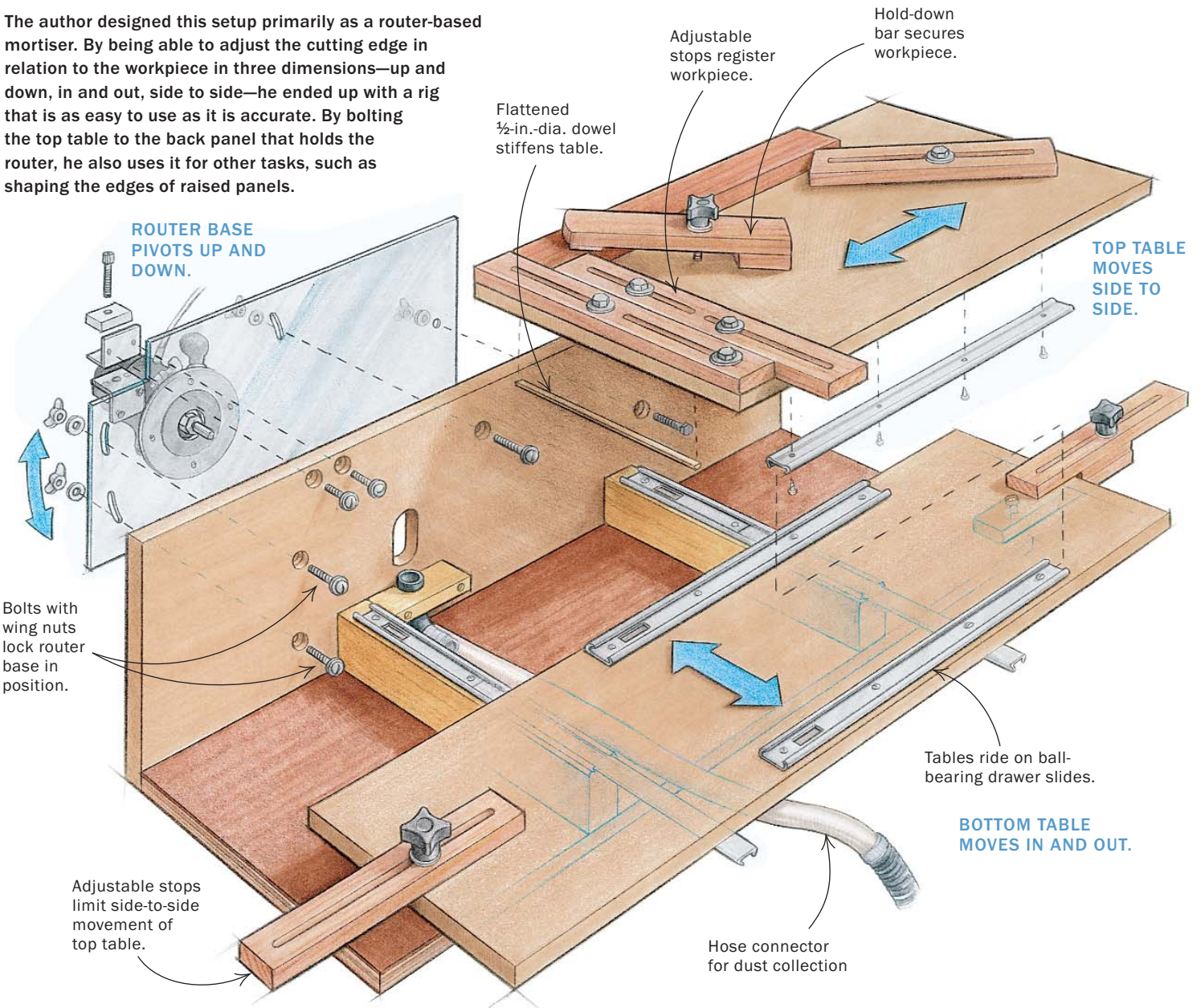
I wanted a system that could be set up easily and be operated safely and that could accurately duplicate a mortising operation. Also, I needed a machine that could raise or lower the cutting bit as necessary for precise adjustments. But I wasn't sure that my scheme would work, and I didn't want to spend a lot of money on a failed experiment, so I built this setup with scraps and hardware left over from previous projects. The design I finally built (see the drawing on p. 68) was that of a horizontal compound-mortising table. As designed, it is meant to mortise mostly ¾-in.-thick lumber workpieces, using a solid-carbide, ¼-in. spiral upcut bit, powered by a standard 1½-hp router, which I mounted on a vertical back panel. (I did buy a new Porter-Cable model No. 690 router, figuring that I could use it in the shop even if my experiment failed.)

The machine has two movable tables. The top table moves

Photos, except where noted: Jefferson Kolle

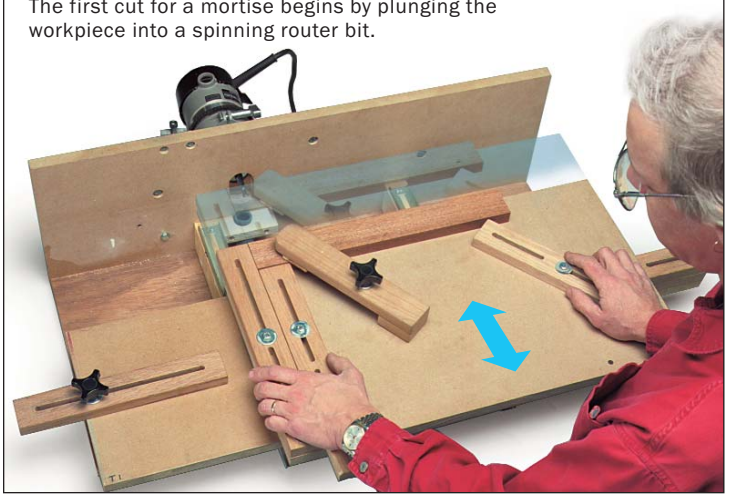
ONE NIFTY SHOP-BUILT MACHINE

The author designed this setup primarily as a router-based mortiser. By being able to adjust the cutting edge in relation to the workpiece in three dimensions—up and down, in and out, side to side—he ended up with a rig that is as easy to use as it is accurate. By bolting the top table to the back panel that holds the router, he also uses it for other tasks, such as shaping the edges of raised panels.

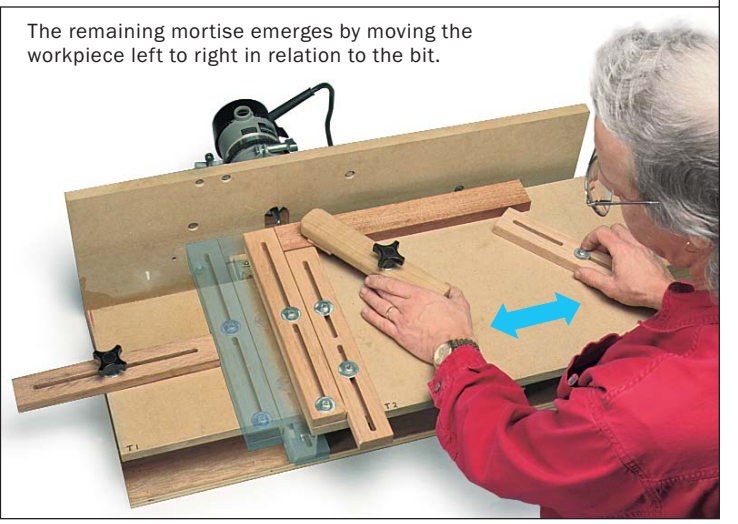


HOW IT WORKS

The first cut for a mortise begins by plunging the workpiece into a spinning router bit.



The remaining mortise emerges by moving the workpiece left to right in relation to the bit.



Drawing: Bob La Pointe

at right angles to the bit, and the bottom table moves parallel to it. I mounted two drawer slides (Accuride model No. C-1029 center-mount slides) under the tables to provide for the side-to-side and front-to-back movements of the tables. Movable stops at each end of the bottom table can be set to control the distance the top table can move and thus the length of the mortise.

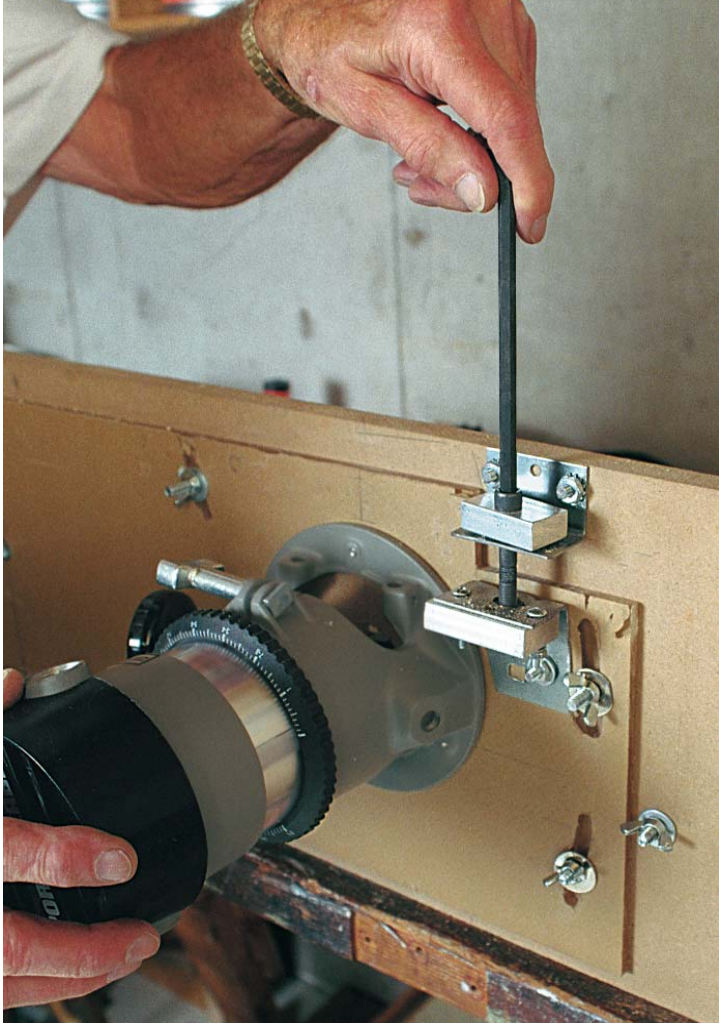
Indexed adjustments are the key to accuracy—To improve accuracy and to speed up the mortising process, I wanted stops wherever possible to position the workpiece for mortising rather than to depend upon pencil layout lines. By butting the workpiece against a stop, I could ensure the accuracy and the reliability of matching stile-and-rail joints.

For a given frame or set of frames, I wanted to position the stops only one time for both left and right mortises. The other option would have been to reposition the stops when going from a left to a right mortise, but it would be faster to flip the workpiece over, end for end.

To position the mortise with such a high level of precision in the center of the workpiece, the router would have to be mounted on the back panel so that it could be raised or lowered until the bit cut into the exact center of the workpiece. Using a threaded bolt to raise and lower the router (see the photo above) and a dial indicator to check the adjustments, I could fine-tune the height of the cutting bit very easily.

To make a mortise near the middle of a stile—such as that required for a center rail—the stops have to be removed, and you must use layout lines to position the workpiece for the cut.

The original setup needed some tweaking—The prototype of this machine worked beyond my expectations, except for one defect.



One turn of the threaded bolt can raise or lower the router. *The author rigged up the adjusting device shown here to enhance his ability to fine-tune the height of the router bit in relation to the workpiece. The router swivels up and down on a Plexiglas base that is hinged on one end of the vertical panel to which it is secured.*

When moving the top table forward into the cutting bit, I tended to press down on the table with enough force to deflect it sufficiently that it cut the mortise off center. To correct this, I snugly fitted a flattened ½-in. dowel to the underside of each end of the top table and added a little wax on the surfaces where the dowels slid against the bottom table.

Also, I added a hold-down bar on the top table for safety and to improve the accuracy of each setup. And finally, a 1¼-in.-dia. vacuum hose (mounted directly beneath the router bit and connected to a standard shop vacuum) collects most of the dust and chips generated by mortising operations.

Use this machine as a mortiser or as a conventional router table

After setting up the machine to cut a mortise, it's best to plunge the workpiece repeatedly into the cutting bit, drilling a series of holes, by moving the bottom table in and out and adjusting the top table a little for each plunge.

After that, clean up the sidewalls of the mortise by moving the top table left to right between the stops (which are mounted on both sides of the bottom table). Also, by clamping a fence on the top table 45° to the back panel, you can drill mortises into the ends of a 45° miter using essentially the same procedure.

By bolting the top table to the back panel—using two brackets on the underside—you can turn this machine into a router table, good for any number of shaping tasks. For years I've wanted to cut raised panels, but I've always felt uneasy about using either a 4½-in.-dia. shaper cutter or a vertical router table. The amount of spinning steel in a large cutter scares me, and using a vertical panel-raising bit in a vertical router doesn't appeal to me because it's awkward to move a large panel through the cutter resting only on its edge. But by using a vertical panel-raising bit horizontally in this machine, I was able to address all of my concerns and to get good results because the panel lies flat on the table, and it's easy to control.

Loose tenons can be made in large quantities—I manufacture a variety of loose tenons before I need them, making 100 or so at a time in varying widths and lengths. I use ¼-in. hardboard, ripped to width, and I round over the edges with a ¼-in. bullnose bit. Because the length of the mortise can be controlled with considerable accuracy by the mortising machine, the width of the tenons is not a critical dimension, and I'm able to stockpile a pretty good supply without worrying about whether they will fit later on.

I completed my three projects in a reasonable period of time and in the process made several hundred mortise-and-loose-tenon joints with safety, accuracy and speed. This machine is quite specialized, and I don't have to use it very often, but when I do, it saves me a bundle of time. □

John F. Matousek lives in Englewood, Colo., and is retired from his career as an information systems engineer.

Photos, facing page: Michael Pekovich