

# Precision

The miter shoot allows you to plane components for a perfect fit

BY TOBY  
WINTERINGHAM

“What’s that?” asked Peter Korn, looking at the thing clamped in the tail vise of my bench. The object was a screw miter shoot that I use on almost every project. Korn, director of the Center for Furniture Craftsmanship in Maine, had come to my shop to invite me to teach at the school. When I accepted, he asked if I would bring my miter shoot. “No,” I replied, “but I’ll make one for you while I’m there.”

In my workshop, students make a miter shoot as their first task. It teaches them the importance of accuracy, care, and respect for tools, and they leave with a jig that will benefit them throughout their careers.

The miter shoot consists of two working surfaces aligned at 45° and 90°. The former is used to true up miter joints; the latter, to square up tenon shoulders and cheeks.

I can’t claim credit for inventing this tool. As a student at the Royal College of Art in

## GOOD FOR MORE THAN MITERS

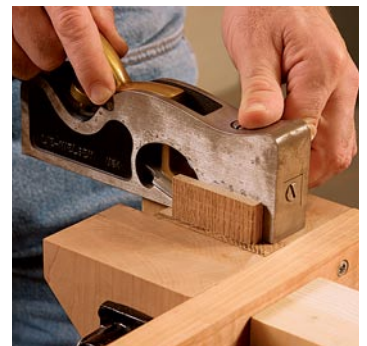
Although the jig is known as a miter shoot because it can be used to trim joints at precisely 45°, the opposite side is set at 90° and can be used to fine-tune mortise-and-tenon joints.



**Master the miter.** Use the shoot to true up parts for miter joints. The base prevents tearout on the outside edges.

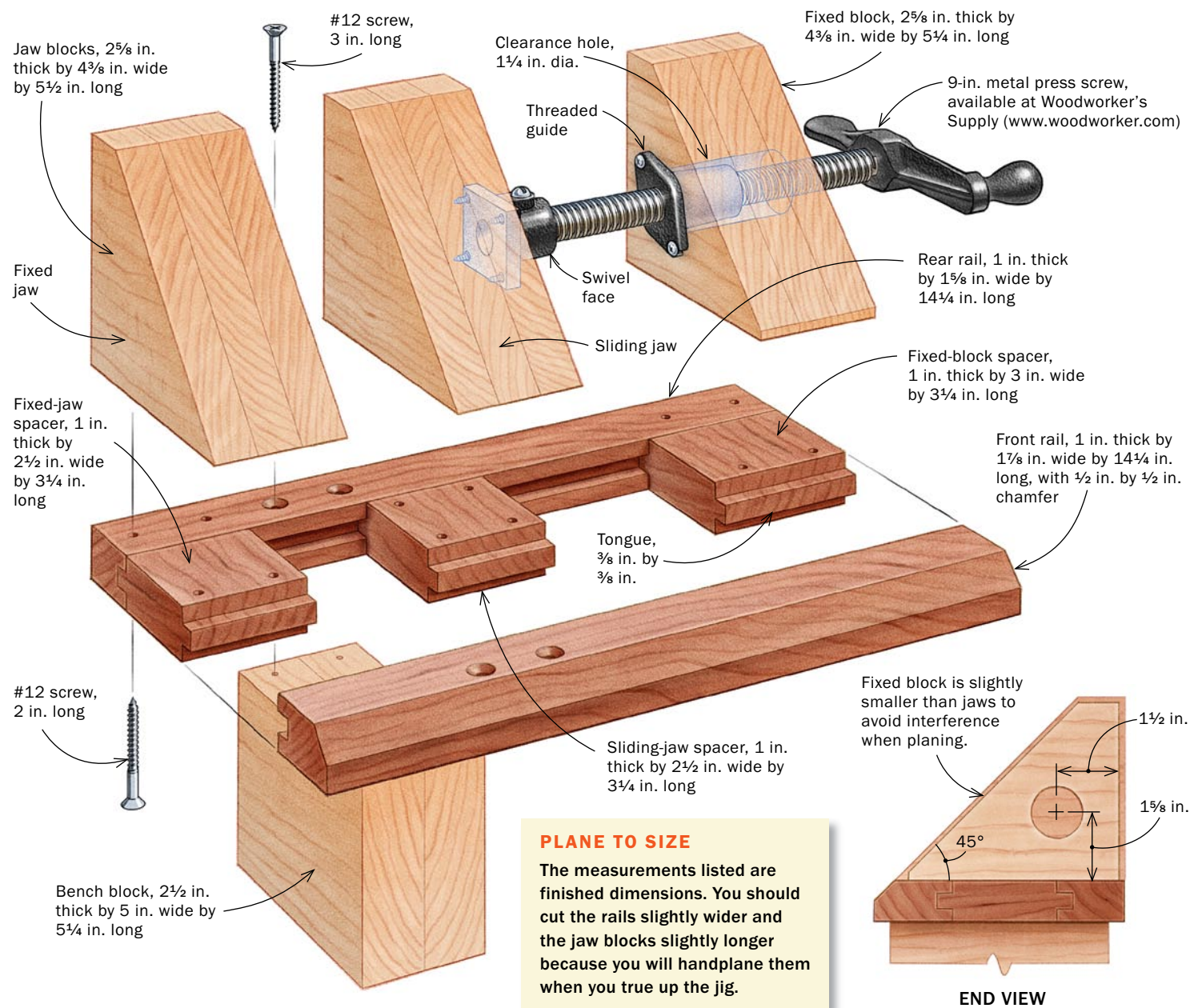


**Tame your tenons.** A shoulder plane can be used on its side (left) to trim a tenon’s cheeks. Used vertically (right), it can trim and square the tenon shoulders.





# Jig for Precise Joints



London, I discovered a decrepit one gathering dust under a bench. Even in poor condition, the jig was so much better than a bench vise for trimming miters that I decided to build one for myself.

## The base has a sliding block

The shoot consists of a metal press screw attached to a fixed block; a pair of wooden jaws, one of which slides along a tongue-and-groove base; and a block attached to the underside of the base that mounts in a bench vise. I quickly realized that the

secret to this tool is accuracy: The sliding jaw must run smoothly on the base with no sloppiness. Time invested in construction will pay dividends during use.

The base consists of two rails separated by three spacer blocks. The middle block slides up and down the rails. The easiest way to cut the tongue-and-groove joinery is with a rabbeting bit in a router table, but you also could use a dado blade on the tablesaw. In either case, the three spacers must start out identical in length to keep the rails parallel. Then take a thin shaving

off the shoulders and the cheeks of the center spacer, just enough that it will slide while keeping the fit snug. A little wax on the final assembly also helps. When you are certain that you have the right fit, glue the end spacers to the rails with the sliding spacer between them. After glue-up, plane the base perfectly flat.

## Fit the jaws and install the metal screw

Although you can make the fixed block and the two jaws from any tight-grained 12/4 or 10/4 hardwood, it is cheaper to



# 1 MAKE THE FRAME AND ATTACH THE FIXED JAW



**Dry-fit the base.** Before you glue the two end stretchers to the rails, check that the center stretcher will slide freely but with minimum play.

**Create the jaw blocks.** After flattening and squaring the laminated stock for the jaws and the fixed block, make the 90° and 45° crosscuts. You might have to screw on a piece of scrap to handle the short blocks safely.



laminated three pieces of 4/4 wood. This also results in less wood movement. After the glue has dried, mill and handplane the sections perfectly true and square—the sides must meet at exactly 90°. Then make the 45° and 90° cuts on the miter saw or the tablesaw, leaving the jaws slightly oversize. Later you will handplane them flush with the base.

On the drill press, drill and countersink holes on the underside of the base for attaching the jaws and the fixed block. On the top of the rails, drill holes for the bench block (see drawing, p. 83). While at the drill press, drill a hole in the fixed block to accept the threaded guide of the press screw. I locate the hole just below center—nearer to the rails to lessen the chances of the jaws skewing on narrow pieces. Don't install the guide just yet.

Both blocks and jaws are attached to the base with long woodworking screws. Because I don't use glue, I can dismantle the miter shoot if it needs adjustment. The easiest way to attach the fixed block to the base is to clamp the block in a vise, then clamp the base to the block. Extend one hole into the block, drive in a short screw, and use a good square to make sure that the block is perpendicular to the long sides and the face of the base. Complete the other three holes one at a time, installing long screws and constantly checking the block for squareness. Finally, replace the first screw with one of the correct length.

Repeat these steps with the fixed jaw. If the fixed jaw is aligned correctly, you can clamp the sliding one to it while fitting its screws. It is still worth checking as you go, because screws tend to pull one way or another. I set the sliding jaw just over the



**Attach the fixed block and fixed jaw.** With the block held in a vise, insert a short screw into the block through predrilled holes in the base (left). Check that the block is square to the base (right), and then insert longer screws into the three remaining holes before replacing the first screw.



**Add the hardware.** Detach the fixed block from the base, insert and screw on the threaded guide, then reattach the block.



## 2 ADD THE SLIDING JAW AND SCREW

**Attach the sliding jaw.** After you have screwed the fixed jaw to the base, clamp the sliding jaw to the fixed jaw and screw it to its sliding spacer.



**Add the swivel face.** Screw the threaded rod through the guide to see where to attach the swivel face to the sliding jaw.



**Screw on the bench block.** A block of wood, screwed to the two rails of the base, holds the miter shoot in a bench vise.

edge of the sliding block so that the jaws make contact but the spacers don't.

Lightly hammer the threaded guide into the fixed block and secure it with screws. Insert the threaded rod, screw on the removable swivel face, and place it against the sliding jaw. Find the location that allows the rod to run true. If there is any angle, the thread will bind as the jaw slides.

Attach a large block to the back of the miter shoot, screwed through the top and bottom rails. This allows the miter shoot to be clamped in either a tail or front vise with either the 90° surface or the 45° surface

faceup. Finally, use a handplane to true up the jaws in line with the base, keeping the surfaces flat and square. Again, the secret is accuracy; so take your time.

### How to use your miter shoot

Take care when you first use the tool. In time, you'll get a feel for the crucial last stroke of the plane that brings the workpiece level with the miter shoot, and will avoid the next pass that planes the surface of the shoot. Used correctly, the surfaces of the jaws do not get worn quickly. I only true up mine once a year.

To true up tenons, fit the workpiece between the jaws with the shoulders fractionally proud of the surface. A few strokes with a shoulder plane will clean up the shoulders and bring them to an even height. Then, with the plane on its side, check that the tenon's faces are square.

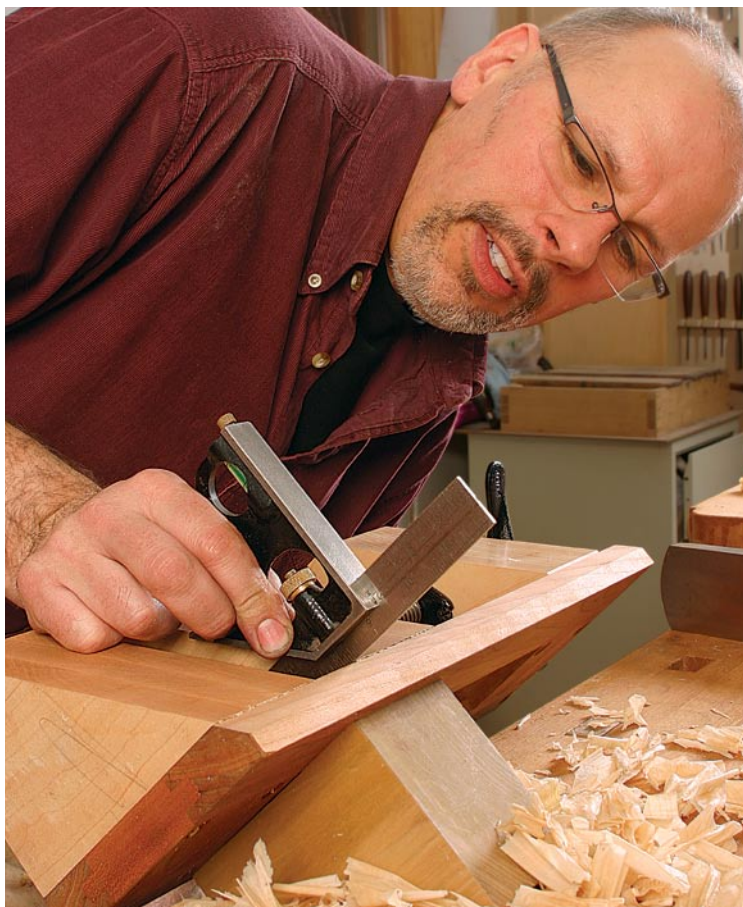
Miter joints will lose their terror now that you can plane each component flat and true without the risk of tearout. □

*Toby Winteringham is a woodworker in Norfolk, England. You can see his work at [www.tobywinteringham.co.uk](http://www.tobywinteringham.co.uk).*

## 3 SQUARE THE JAWS



**True up the miter shoot.** After the tool has been assembled, the two working faces of each jaw must be planed flush with the base while keeping them flat and square.



**Check the angle.** Use a good combination square to check that the face of the miter shoot's jaws are at 45°.