

Turn the corner to **perfect miters**



**There's more than one way to cut and assemble
air-tight miters; we'll show you how.**

When you make a picture frame or place solid-wood edging around a plywood panel, you want perfect, gap-free miters. Anything less detracts from the whole project.

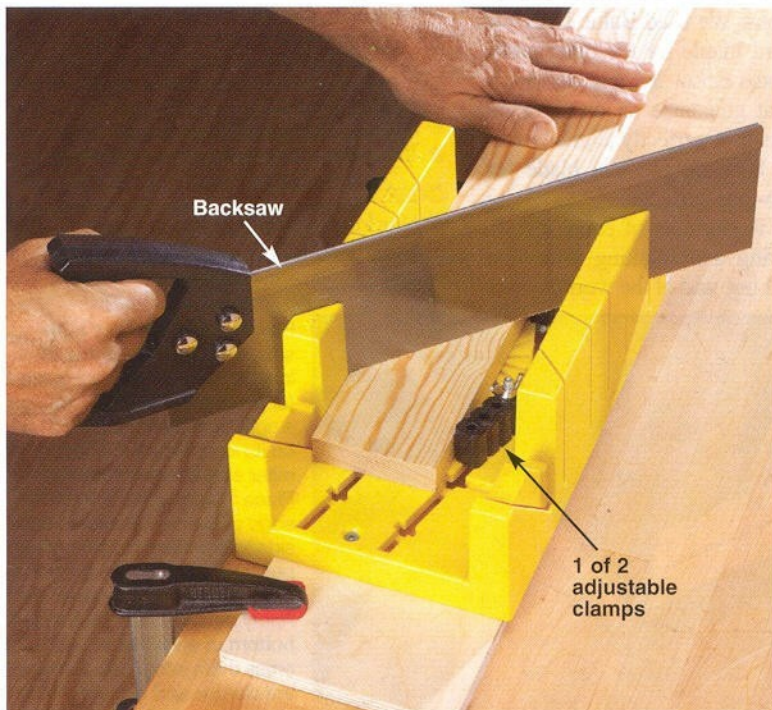
In this article, we'll show you several ways to cut 45° angles, and help you achieve right-angle miter joints that practi-

cally disappear. We'll discuss five common approaches, moving from low-tech, low-cost methods to those that rely on power tools.

No single approach satisfies everyone's needs. Some woodworkers don't have a tablesaw, some workpieces are too long to cut comfortably on a tablesaw, and some

jobs call for mitering away from the workshop. So we looked into a whole range of tools to serve every mitering purpose. We found that you can get respectable results from all of them, but that occasionally you'll need to do some fine-tuning. Don't worry, we'll show you three ways to handle that task by shaving or sanding.

First, two simple approaches



Pre-formed miter box

Miter quality: Good to poor

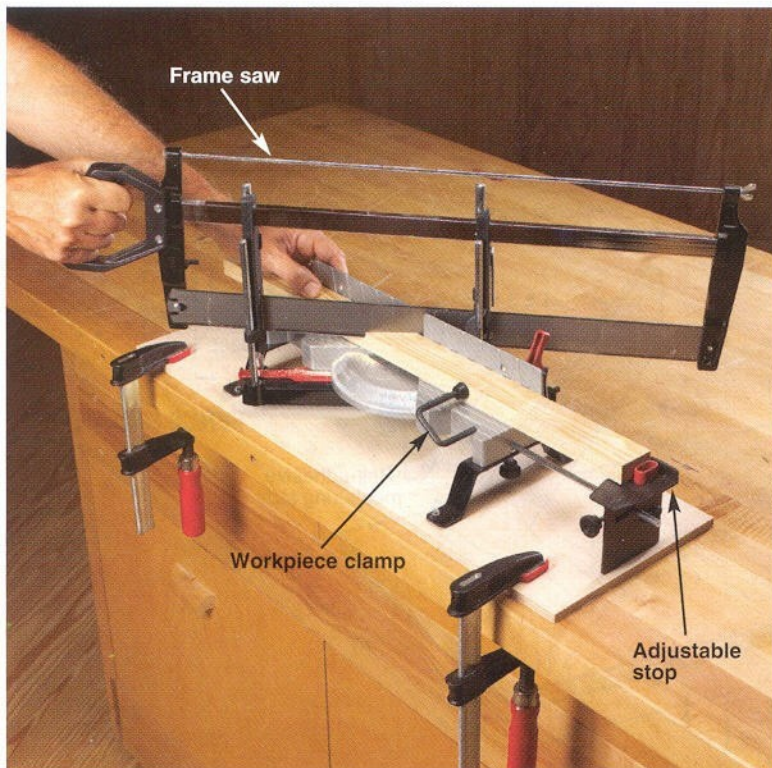
For \$10 or so, you can buy a plastic miter box and a backsaw. The one we used gave acceptable results on narrow molding. However, with the provided saw, which has 11 teeth per inch (tpi), cutting a larger workpiece proved to be slow going. A slight amount of slop in the molded slots caused miter accuracy to vary from cut to cut. We also noticed that the cut surfaces were slightly rough.

PROS:

- ▲ Super safe—no chance of injury or kickback.
- ▲ Very inexpensive.
- ▲ Very portable.
- ▲ You can substitute a higher-quality backsaw.

CONS:

- ▼ Stock width limited by size of miter box.
- ▼ No provision for fine-tuning the 45° settings.
- ▼ Clamping workpiece is awkward.
- ▼ No provision for workpiece support or stops.
- ▼ You're restricted to short saw strokes; the blade easily can slip out of the guide slot.
- ▼ Time-consuming.



Adjustable miter box

Miter quality: Good to fair

You can buy several models of miter boxes that allow the saw to pivot from one 45° detent setting to the other. They come with backsaws or frame saws. We tried out a frame-saw model priced at about \$85. It's easier to use than the plastic miter box, and the saw (24 tpi) cut slightly smoother. However, it provides no way to lock the saw at non-detent settings, and no way to fine-tune the detent settings. If you decide to buy a similar miter box, check for those options.

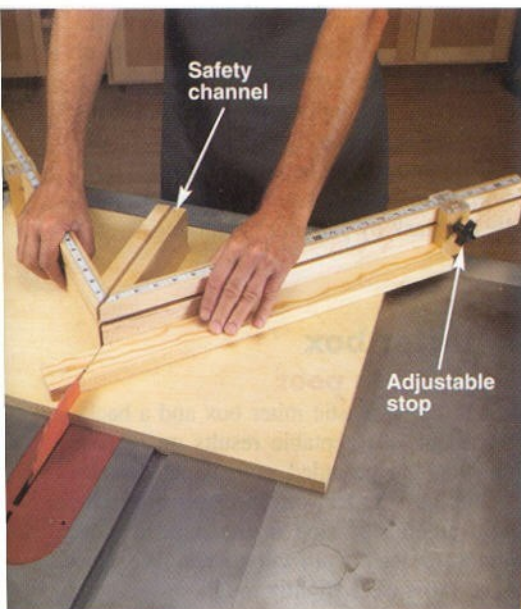
PROS:

- ▲ Safe to use.
- ▲ Reasonably priced.
- ▲ Portable.
- ▲ Detents at both 45° settings.
- ▲ Clamp and stop included, but both have limited range.

CONS:

- ▼ No provision for fine-tuning the 45° settings.
- ▼ Blade can flex enough to affect cut quality.
- ▼ Time-consuming.

Now, let's add power



Shopmade miter sled teamed with a tablesaw

Miter quality: Excellent

This miter-cutting sled offers a dual-rail guidance system that rides in the miter-gauge slots of your tablesaw and smooth-acting stops that ride in tracks. It also features a safety channel down the middle to keep your hands away from the tablesaw blade.

To build the jig, see the drawing at bottom for the dimensions. We used Baltic birch for the base and hard maple for the other parts. Refer to the photos below left and below for building tips that guarantee an exact fit on your saw and a pair of perfectly aligned miter fences. Use an 80-tooth crosscut blade for smooth, ready-to-glue surfaces.

To make two workpieces of equal length, start by measuring and marking your first workpiece. Miter one end of the workpiece as

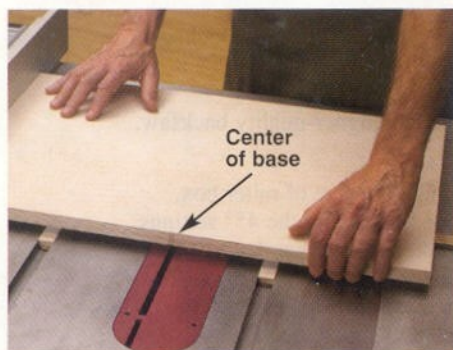
marked, using the appropriate fence, and then transfer the workpiece to the opposite fence. Line up the mark with the blade, slide the stop against the already mitered end, tighten it, and make the second cut. Leave the stop in place, and miter the second workpiece in the same sequence. Remember to stop your cut when the blade's highest point passes through the fence to avoid weakening the sled base.

PROS:

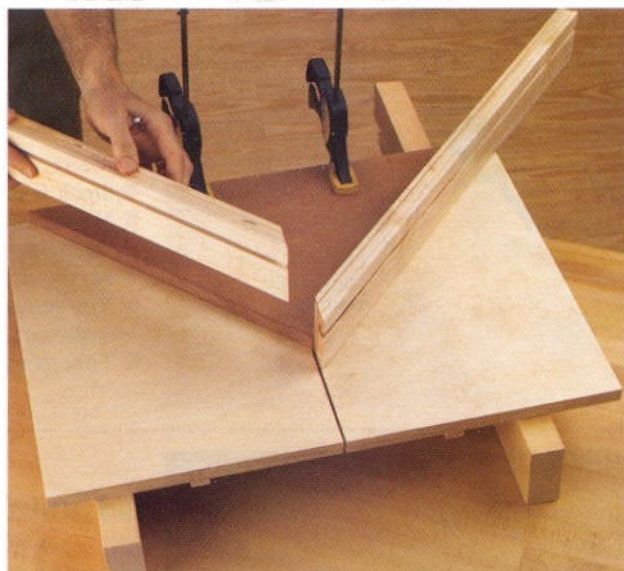
- ◆ Fast cuts, even in thick, hard materials.
- ◆ Combination of tablesaw and jig provides accurate, consistent, and smooth cuts.
- ◆ Makes fine trimming cuts.
- ◆ Inexpensive to build.

CONS:

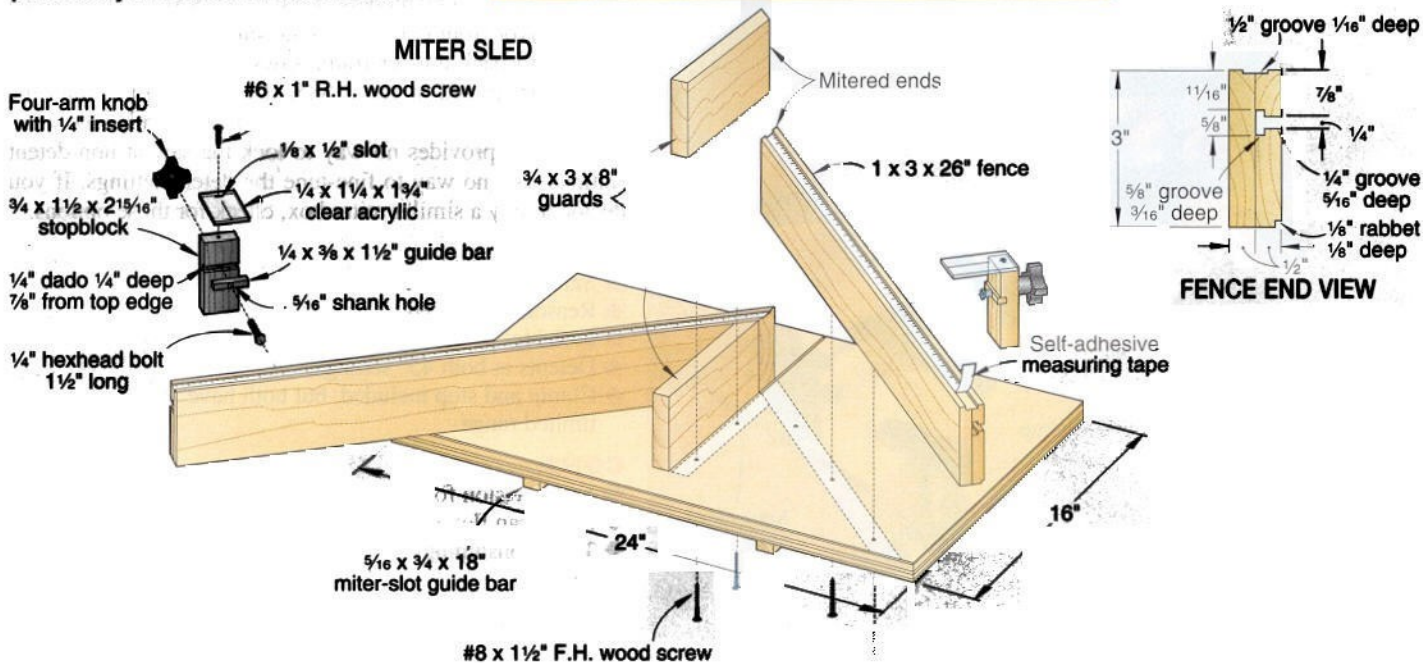
- ◆ Hard to handle long workpieces.
- ◆ Dedicated to 45° cuts only.



To fit the guide bars to your miter sled, place two stacks of two pennies in each miter-gauge slot on your tablesaw to serve as shims. Place a bar in each slot, and apply double-faced tape to the top of each bar. Mark the center of the sled base, and locate the rip fence to place that mark over the blade. Press the base against the bars, remove the assembly from the saw, and permanently attach the bars with screws.



Place the sled on your table saw, and cut a kerf about 6" long to serve as a visual guide for placing the fences. Now, cut a right triangle measuring 21 1/2" on its long edge to fit on the miter sled base as shown. Place it flush with the back edge of the sled, centered from side to side, and clamp it in position to serve as a guide for installing the miter fences. Apply double-faced tape to the bottom of each fence, and press them into place. Remove the clamps and triangle guide, and make test cuts in scrap to check your sled's accuracy. When it's dead-on, permanently attach the fences with screws, making sure that they sit perpendicular to the sled base.



Power mitersaws

Miter quality: Excellent to good

Mitering long pieces is much more convenient on a power mitersaw, such as the one shown at left. As with the tablesaw, your first step should be to make sure the tool is aligned properly. (See issue 143, page 96, for tune-up tips.) Next, construct a permanent or temporary work support, making it as long as necessary on each side of the saw, and flush with the saw table. (See the "On-the-mark mitersaw station" article on page 14.) Install a sharp mitersaw crosscut blade, preferably one with 60 teeth and a negative hook angle. Then, with the workpiece held or clamped firmly in place, lower the blade through the workpiece slowly for a smooth cut.

PROS:

- ▲ Fast cuts, even in thick, hard materials.
- ▲ Adjustable to any angle, as well as having 45° detents.
- ▲ Good for long workpieces and repeatable cuts, if provided with suitable workstation.
- ▲ Removes tiny amounts of material if needed to fine-tune miters.
- ▲ Portable.

CONS:

- ▼ Can be awkward to cut long stock without dedicated support and fence system.
- ▼ Throws a lot of hard-to-collect sawdust into the air.
- ▼ More blade runout than a well-tuned tablesaw.



Radial-arm saw

Miter quality: Excellent to fair

If you own a radial-arm saw, you face the same issues as just discussed: Accurate set-up and adequate workpiece support. As with the power mitersaw, the radial-arm saw's main advantage over the tablesaw is in the handling of long workpieces. Place your workpiece flat on the table and butted against the fence, with the saw head pivoted to 45°.

PROS:

- ▲ Fast cuts, even in thick, hard materials.
- ▲ Handles long workpieces if surrounded by a flush support surface.
- ▲ Removes tiny amounts of material if needed to fine-tune miters.

CONS:

- ▼ Takes up a lot of room.
- ▼ Limited capacity when cutting 45° to the left because blade is located left of saw arm center.
- ▼ Many models have a tendency to move off the 45° setting, resulting in an imperfect cut.



Our top recommendation for cutting 45° angles

You might need another tool now and then, but we suggest that you build the miter-cutting sled shown *opposite*, and rely on your tablesaw (tuned up as shown in issue 152, of course) for most of

your mitering work. This method offers accuracy, consistency, and control, and it's how we prefer to miter flat workpieces and molding in the *WOOD*® magazine shop.

3 ways to trim to a perfect fit

Despite your best efforts, it's likely that you'll need to trim one or more miters to make a perfectly fitted frame. Check each 45° cut as you work, as shown in the photo at *right*. When you fit all of the miters together, check each joint for inaccuracies like those shown on the drawings at *far right*. Problems result when one or more miters are slightly more or less than 45°, when a workpiece is slightly longer than its mate, or when the cut isn't at 90° to the workpiece face. Turn the page for three ways to trim a miter.

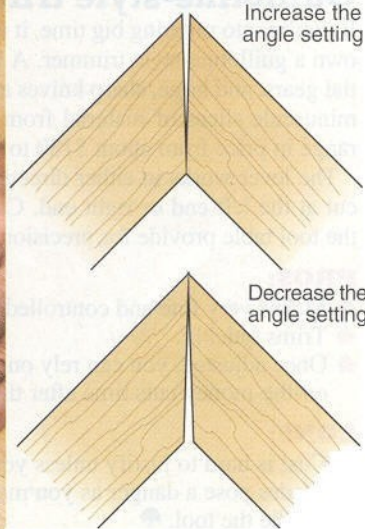
A well-made combination square, such as this Starrett tool, quickly shows you whether your miters are a true 45°. And yet, you still might have to trim those cuts slightly to produce a frame with four tight miter joints because the workpiece might vary slightly in length or your miter cuts might not be 90° to the workpiece face.



TO FIX THESE GAPS

Increase the angle setting

Decrease the angle setting

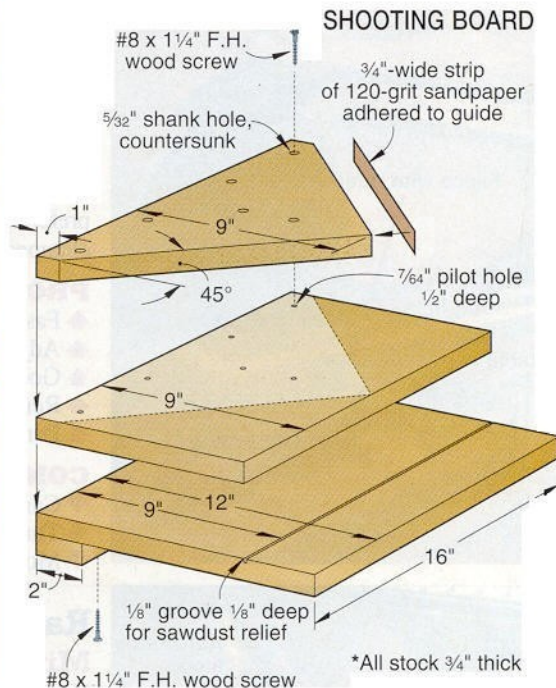
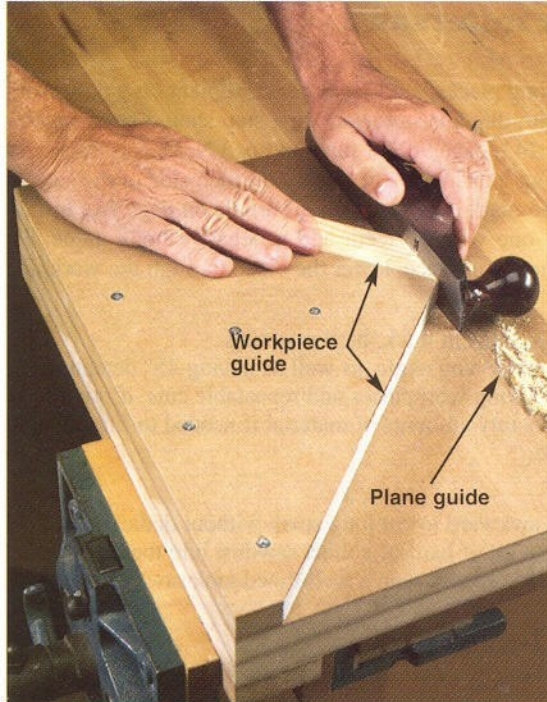


Shooting board

You can trim a miter quickly and accurately with nothing more than a sharp hand plane and a simple jig, like the one shown in the drawing at *far right*. We built the jig out of medium-density fiberboard (MDF), making sure that all of the cut edges were perpendicular to the faces.

Clamp the jig in your vise, and then place the workpiece against the appropriate guide, allowing the mitered end to protrude just slightly beyond the plane guide. Set your plane for a light cut, place it on its side as shown in the photo at *right*, and make a pass across the miter.

As with any method for trimming miters, this one calls for frequent testing of the results. Depending on how much material you need to remove, test the fit after one or several passes.



PROS:

- ◆ Inexpensive.
- ◆ Easy to control the amount of material removed.

CONS:

- ◆ Time-consuming.
- ◆ Jig requires precise construction for accurate mitering results.



Disc sander

It's quicker and easier to use a disc sander, if you own one. Set your miter gauge to 45°, and place it in the horizontal slot of your disc sander table. Now, choose a piece of MDF or solid wood for an auxiliary miter-gauge fence, hold it against the miter gauge, and form a long miter at one end by pressing it into the spinning disc. Use screws to attach the auxiliary fence so that it lightly contacts the sanding disc.

Equip the disc sander with a fine-grit disc (180 grit would be a good choice) to produce a smooth gluing surface and avoid removing more material than you intended. Now, it's a simple matter of holding the workpiece against the auxiliary fence, and lightly pressing the miter against the spinning disc. As you work, move the miter gauge and workpiece back and forth slightly to achieve the smoothest possible surface.

PROS:

- ◆ Trims quickly.
- ◆ Requires little physical effort.

CONS:

- ◆ It's easy to remove more material than you intended.

Guillotine-style trimmer

If you're into mitering big time, it might make sense to own a guillotine-style trimmer. A long lever, substantial gears, and large, sharp knives allow you to remove minuscule slices of material from any miter. Models range in price from about \$180 to \$300.

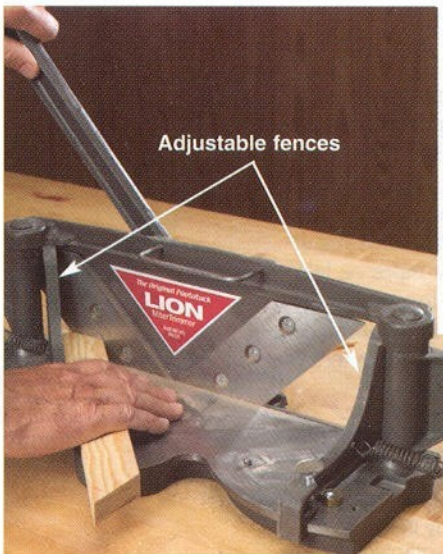
The lever works in either direction, allowing you to cut at the left end or right end. Cam-action inserts in the tool table provide for precision adjustment.

PROS:

- ◆ Makes very fine and controlled cuts.
- ◆ Trims quickly.
- ◆ Once adjusted, you can rely on it for on-the-money cuts time after time.

CONS:

- ◆ Cost is hard to justify unless you use it frequently.
- ◆ Blades pose a danger as you move and handle the tool. ⚠



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<http://woodstore.woodmall.com/dow.html>

