

Router-Table Basics

Are you getting the most from this workshop fixture?

BY GARY ROGOWSKI



Contrary to what some woodworkers believe, a router is not the quickest way to ruin a piece of wood. In fact, when mounted underneath a flat table, a router is one of my shop's most versatile and reliable tools.

I began using router tables in the 1970s, shortly after seeing one for the first time and not long after I became a woodworker. The idea was an instant winner: a table or cabinet with a router mounted upside down underneath so that the bit stands straight up through a hole in the surface. The table's broad, flat top and square fence support the work and provide reference surfaces for accurate cutting. It's also easy to clamp blocks to the table for stopped cuts.

The tool's combination of easy use and accuracy has helped transform woodworking, especially for the small shop. With a properly set up table, a woodworker can produce hundreds of feet

of molding in a single shop session. The user also can cut rabbets, dados, and other joinery, and—with the help of templates—can easily replicate shaped furniture parts.

There are a great many things that a router table can help you accomplish. Here are the techniques I turn to time and again for great-looking and accurate results.

Don't bypass the basics

When setting up and using a router table, you'll want to pay attention to a few basics.

Take care to set up the table at a comfortable height that lets you see and control the work. The older I get, the taller I like mine. On store-bought models, check that the mounting insert is flat and level with the table surface. Shim it with leveling screws or pieces of masking tape; if it's not level, you won't get a consistent

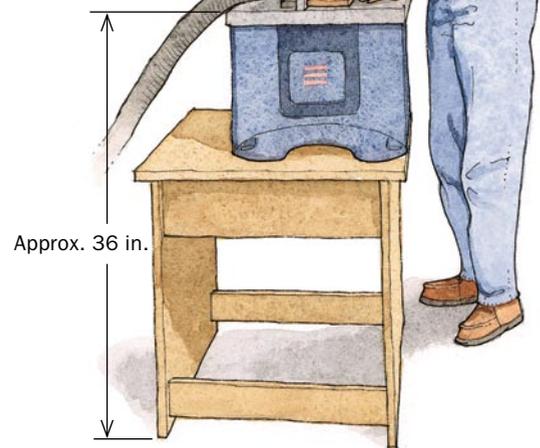


GETTING STARTED

Time spent on setup will pay dividends in comfort and accuracy for years to come. To improve safety, minimize the opening around the bit and learn the right way to feed stock.

GET THE RIGHT HEIGHT

Place the router table at a height that allows you to see and control the work comfortably. A good starting point is around 36 in. to 38 in.



depth of cut. The fence should be flat, straight, and square to the worksurface.

Always make sure that the fence opening is closed as tightly as possible without interfering with the bit. This will ensure the best support for the stock as it passes the cutter.

When feeding stock past the bit, bear in mind a couple of things. First, keep the stock between you and the bit; in other words, don't trap it between the bit and the fence. Move the wood from right to left (into the bit's rotation). The rotating bit will try to pull the work into the fence or into the bearing on the bit, giving you good control and better accuracy. For most operations, you'll feed the work into the bit with your right hand and use your left to hold the piece snug against the fence or table as you move it past the bit.

For safety's sake, never put your hand over the bit area, even if there's wood covering the bit. Bits have been known to drill their way through a board. Also keep your hand away from the exit point on a through cut. Use a push stick with smaller boards and use featherboards with thin stock.

In hardwoods, keep the depth of cut around $\frac{1}{8}$ in. per pass. This avoids burning the stock and saves wear and tear on bits. You can make a deeper pass in softwoods. You'll need to experiment with feed rate, but remember the general trade-off: A slower pass yields



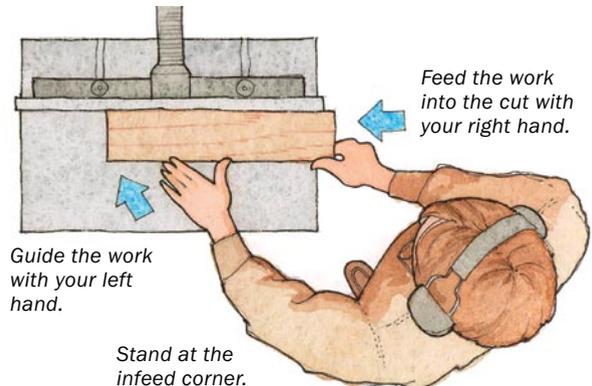
Make sure the insert holding the router is level with the surrounding table. Many store-bought tables are equipped with insert plates that hold the router in the table. Most can be shimmed or adjusted with setscrews.



Adjust the fence opening to fit the bit. A narrow gap around a partially exposed bit reduces tearout (left). For a fully exposed bit, close the fence completely so the stock doesn't dive into the gap (right).

PROPERLY FEED THE WORKPIECE INTO THE BIT

The work should move from right to left, so the bit's rotation pushes it into the fence.



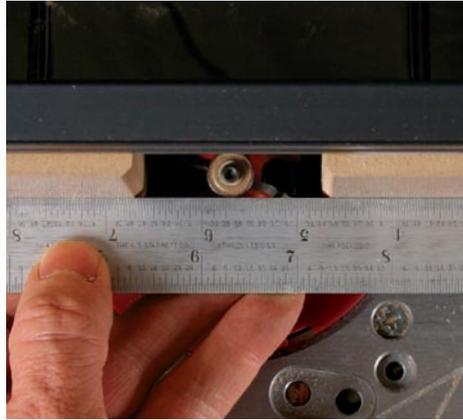
Feed the work into the cut with your right hand.

Guide the work with your left hand.

Stand at the infeed corner.

MOLDING

Moldings are the most common use for a router table. A few important tips will ensure burn- and chatter-free results.



Align the fence with the bearing. For a full-depth cut, the stock should ride the bearing without being pushed away from the fence. Adjust the bit height to make a series of passes.

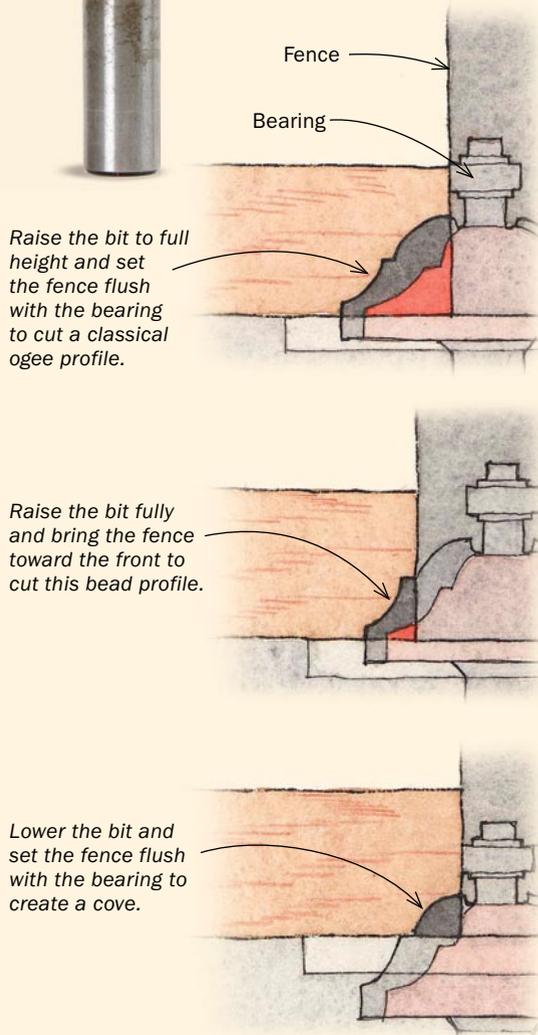


ONE BIT, MANY PROFILES

A router table's moveable fence and bit give the user a lot of creative freedom. To see this flexibility shine, chuck up your favorite profiling bit and experiment a little. Interesting things are bound to happen.

The advantages are probably most obvious with a multiple-profile bit: **Raise the bit and cut a bead on a narrow edge. Move the fence in or out to set the depth of the bead. Lower the bit and cut a double ogee in wide molding stock.**

The same principle applies to simpler bits. **Roundover, cove, or chamfering bits can cut edge treatments of varying depth and height, with or without small steps (called fillets).**



Raise the bit to full height and set the fence flush with the bearing to cut a classical ogee profile.

Raise the bit fully and bring the fence toward the front to cut this bead profile.

Lower the bit and set the fence flush with the bearing to create a cove.

Wide stock is better.

When possible, cut molding profiles in wide stock to keep your hands safely away from the bit. A heavier workpiece is also less prone to chatter. It's easy then to rip the molding strip from the wider board.



a cleaner cut (especially in tricky grain), but a quick pass avoids burning the stock. End grain is especially susceptible to burning.

Making molding is easy

The router table is great for cutting molding because of its large reference surfaces and because its fixed bit allows you to bring narrow stock to the cutter. Making such cuts with a handheld router is nearly impossible, either because the work is too small or the bit is too large for handheld operation.

When cutting molding in thin stock, use featherboards to hold the work to the table and fence. This keeps your hands clear of the cutter and makes for a more consistent cut—long, thin stock has a tendency to bow. An alternative is to mill up wider stock, cut the molding profile in the edge, and then rip it to size on the tablesaw.

Most edge-forming bits come fitted with a ball bearing on the shank that limits the depth of cut. For a full-depth cut, be sure to align the fence with the front of this bearing to avoid bumping the stock out as it runs up on the bearing.

It's also possible to cut several different profiles using a single bit by altering the bit height and/or setting the fence to expose varying portions of the bit.

Master straight cuts for basic joinery

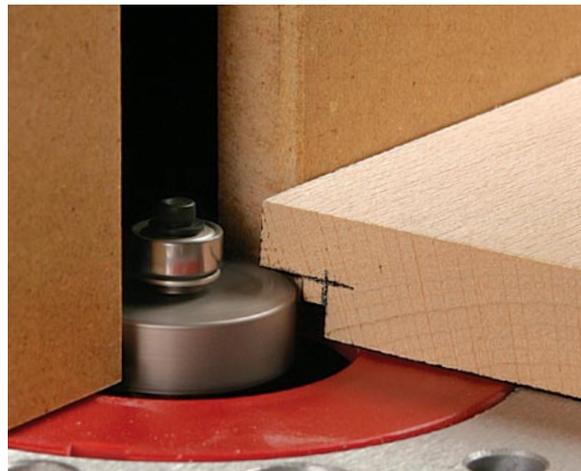
A router table easily makes cuts parallel to an edge using straight bits, which means it is ideal for cutting joinery based on rabbets, dados, and grooves.

Rabbets—With the stock face down on the table, bit height determines the rabbet's depth and fence position controls the width, so a bearing-guided rabbeting bit is not necessary. Don't worry about the fence being parallel to any edge of the router table—the only important issue is the distance to the outside edge of the bit. If you're cutting rabbets deeper than 1/8 in., adjust the bit height to take one or more intermediate passes.

Similarly, when making end-grain rabbets to fashion tenons, set the fence distance to make the proper shoulder cut and adjust the bit height to gradually remove stock from each face. You can speed up the process by first bandsawing away the bulk of the waste. Don't trim too heavily with the router. Remember that any adjustment in bit height will be effectively doubled if you're trimming both sides of the tenon to keep it centered. One way to avoid trimming too much at one time, especially when sneaking up on a snug fit, is to

RABBETS

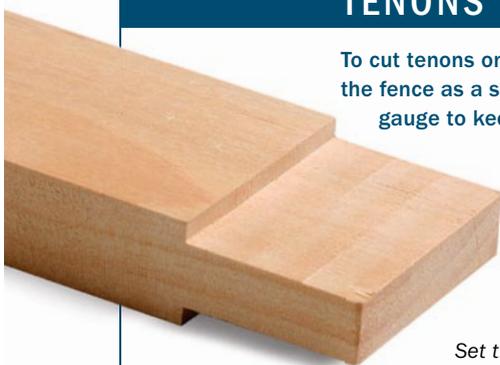
Rabbets are easy on all but the largest panels. For accuracy, be sure to keep the workpiece pressed against the table as it passes by the bit.



Cut rabbets in passes. Set the fence at the shoulder width and raise the bit incrementally.

TENONS

To cut tenons on the router table, use the fence as a stop and the miter gauge to keep the stock square.



Set the fence to the tenon's full depth and work toward it in several passes.

Tenon

Take several passes over a straight bit to cut the tenon.



A tenon is a pair of end-grain rabbets. Any cross-grain cut will tear out as the bit exits the wood. Avoid this by using a sacrificial board on the miter gauge to support the fibers at the end of the cut.

DADOES

Like rabbets, dadoes are easy on the router table in all but the largest panels. Keep the workpiece pressed down to cut an accurate depth.



Router fence keeps dado cuts straight. For dadoes that are near the edge of a workpiece, use the fence to guide a clean and straight cut.



Remove the fence for interior dado cuts. A miter gauge with an attached fence keeps the cut straight.

CUT A DADO WIDER THAN THE BIT

If you need a custom width or have a limited bit selection, you can get multiple widths simply by adjusting the fence between passes. But if you're making a lot of repetitive cuts, it's quicker to use a spacer between the fence and the workpiece. Make the first pass with the spacer in place and the second without it. The spacer's thickness should match the width you want to add to the cut.



add a paper shim under the stock. If the fit is still too tight, then remove the shim and make another pass.

Dadoes—You can use a router table to cut dadoes in short stock to support shelves or as part of a dado-rabbet joint for light carcass construction. Again, be sure to back up the cut to prevent tearout. The router table can't handle very wide or very long workpieces. As with rabbets, make multiple passes for deeper cuts. Be aware that most plywood is thinner than standard bit sizes, but special undersize bits are available. You also can use a smaller standard bit and make multiple passes (see photos, left).

Grooves—The router table can cut straight grooves in the edges of relatively thin stock, such as rails and stiles for a frame-and-panel door or tongue-and-groove joinery in slats for a cabinet back. With a straight bit, cut grooves with the stock held on edge. Or you can cut long grooves and tongues faster and more cleanly with a horizontal slot cutter, keeping the work flat on the router table and centering the grooves and then resetting the bit height to cut shoulders for the tongues.

Clamp blocks to the fence for stopped cuts

Stopped cuts are used in a variety of ways, such as housing drawer bottoms or hiding joinery for shelving or drawer dividers. A router table is ideal for cutting these joints because its fence is the perfect attachment point for stop blocks that define the limits of the cut.

First, mark your stock to indicate the end points of the stopped cut. Next, mark the diameter of the bit on the fence. The cut begins with the work braced against a stop that is clamped to the right-hand side of the fence. To locate this stop, set the workpiece so that the mark indicating the start of the cut is aligned with the mark on the fence at the left-hand side of the bit. Now clamp a stop block to the fence at the trailing end

of the board. The procedure for locating the left-hand stop is essentially the reverse of this.

Start the stopped cut, pushing the workpiece tightly into the rear stop and gradually lowering it onto the bit. Then move it along the cut until you reach the other stop. Push against the forward stop and fence as you rotate the board up and out of the bit. Use a chisel to square the ends of the cut to the marked end lines.

Cut cross-grain first when raising a panel

To raise a panel on the router table, I use a straight rabbet cut; others make a traditional raised-panel bevel. In either case, make the cross-grain cuts first, then the long-grain cuts. This ensures that the long-grain cuts will remove cross-grain tearout. For thicker panels, make a series of passes to get to the final depth.

There are a number of specialized panel-raising bits for use in the router table. Some profiles come in large-diameter sizes only. Be careful using these bits—dial down the speed to keep vibration and wear-and-tear on your router to a minimum. Hold the workpiece flat to the table when passing it by the bit.

A better choice is a vertical raised-panel bit. These bits have a smaller diameter because the profile runs vertically. With this cut, you hold the workpiece upright against a tall auxiliary fence while the bit is captured inside the fence.

Start with a straight bit for sliding dovetails

Sliding dovetails are typically used for shelf support or drawer construction. For a 1/2-in.-wide sliding dovetail, first remove some waste from the female cut with a 1/4-in. straight bit. Set up the fence so that the 1/4-in. bit is centered exactly in the dado, and use a backer board



Through grooves. Set the fence to position the bit in the middle of the stock. Then run the piece once in each direction. Any slight error will be mirrored, ensuring a perfectly centered groove.

GROOVES

The router table offers excellent support for small workpieces such as door parts. Use push sticks to keep fingers out of harm's way.



Stopped grooves. Mark the outside edges of the bit on the fence. Measure from there and clamp the stop blocks in place. Lower the work onto the bit. When you reach the front stop, brace against it and raise the work. If your bit has no center cutter, move the work back and forth until you're down to depth.



PANELS

A vertical panel-raising bit is lighter than the horizontal type, reducing vibration and wear on the router when raising a panel.

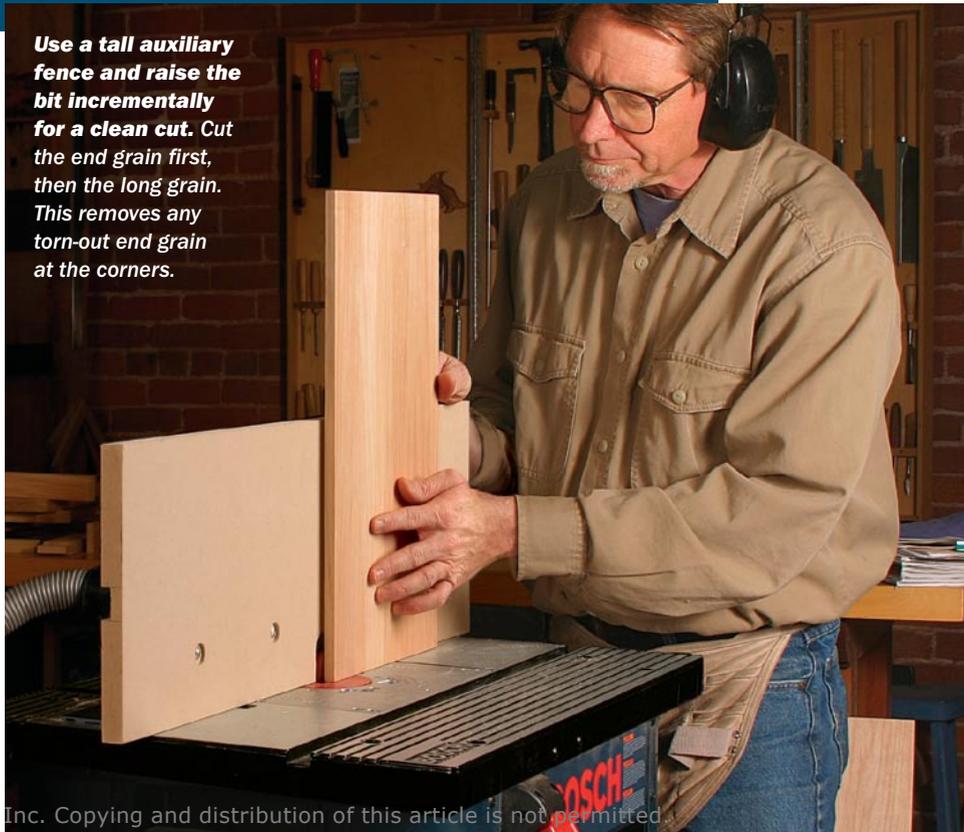


To avoid tearout, make cross-grain cuts first.



Finish with long-grain cuts.

Use a tall auxiliary fence and raise the bit incrementally for a clean cut. Cut the end grain first, then the long grain. This removes any torn-out end grain at the corners.



SLIDING DOVETAILS

If the sliding dovetail is at or near a corner, such as on a drawer, the router table handles both parts perfectly.

QUICK DRAWER JOINT

A sliding dovetail joint is easily made with a straight bit and a dovetail bit.



Start the socket with a straight bit to hog out the waste. Switch to a dovetail bit and cut the socket in one pass (above). Don't change the bit height. Cut the tail with the bit set into the fence, cutting each side in turn and sneaking up on the fit (right). Use a backer board to eliminate tearout.

if it is a through cut. Then mount the dovetail bit to the full depth of cut and make that pass. It will be centered where you need it. Keep the board flat as it goes over the bit. The matching cut is made with the board held vertically against the fence, without changing the bit height. Move the fence to capture most of the bit, and then adjust the fence to take light cuts until the boards just fit together by hand. The joint tends to jam, so tap the pieces apart carefully with a hammer.

A CLOSE RELATIVE

The rabbeted dovetail is a half-version of a sliding dovetail, reinforced with dowels.



A well-dressed rabbet wears dovetails. Use a dovetail bit to cut a pair of mating rabbets for an elegant corner joint.



A carcass joint—the rabbeted dovetail—is easily made with a dovetail bit. Use the bit to cut two mating end-grain rabbets to form a corner. The joint is an attractive way to attach a light-duty drawer front, but it has little mechanical strength. I add dowel pins.

To make the first cut, hold the board flat to the table and put a backer block behind it to prevent tearout. Again, the matching cut is made without adjusting the bit. The bit is captured in the fence so that only a



TEMPLATE ROUTING

A template makes it easy to duplicate curved pieces exactly. The bit's bearing follows the template as the cutter trims the workpiece to match.

Sandwich the workpiece in a jig with a template clamped to the top. Be sure to cut close to the final shape on a bandsaw first, so that the router bit need take only a light pass.



portion peeks out. Holding the workpiece vertically against the fence, move it across the bit. Check the fit and adjust the fence accordingly.

Templates simplify shaping multiple parts

The ability to make curved and shaped parts is essential to fine woodworking, and the router table offers the fastest and most repeatable approach. You'll need an accurate template. Draw or trace your design on a sheet of thin stock such as 1/4-in. plywood. Trim away the waste on the bandsaw, staying about 1/16 in. proud of the lines. Then trim carefully to the lines with a spokeshave, spindle and/or drum sander, or files, rasps, and sandpaper. Any imperfections in the template will be reproduced in the finished piece, so be sure to produce a smooth edge that matches the layout lines.

Before template routing, cut the workpiece close to its final shape on the bandsaw so that you're taking only a light pass with the bit. Templates should be fastened securely to the workpiece with brads, double-sided tape, or clamps. I use quick-action clamps to lock my work and template to a holder. I pass the entire assembly past a bearing-guided, flush-trimming bit to clean up the part. Set the bit height so that the bearing on the bit rides against the template. If the curve is symmetrical, there may be areas where you are cutting against the grain. This can cause major tearout. With my clamping system, I can rout the curve halfway, stop, flip it over, and then rout the other side of it, always cutting downhill or with the grain. □

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AVOID TEAROUT WHILE TEMPLATE ROUTING

Flip the workpiece end for end to avoid routing uphill and tearing out the grain on the wood.

