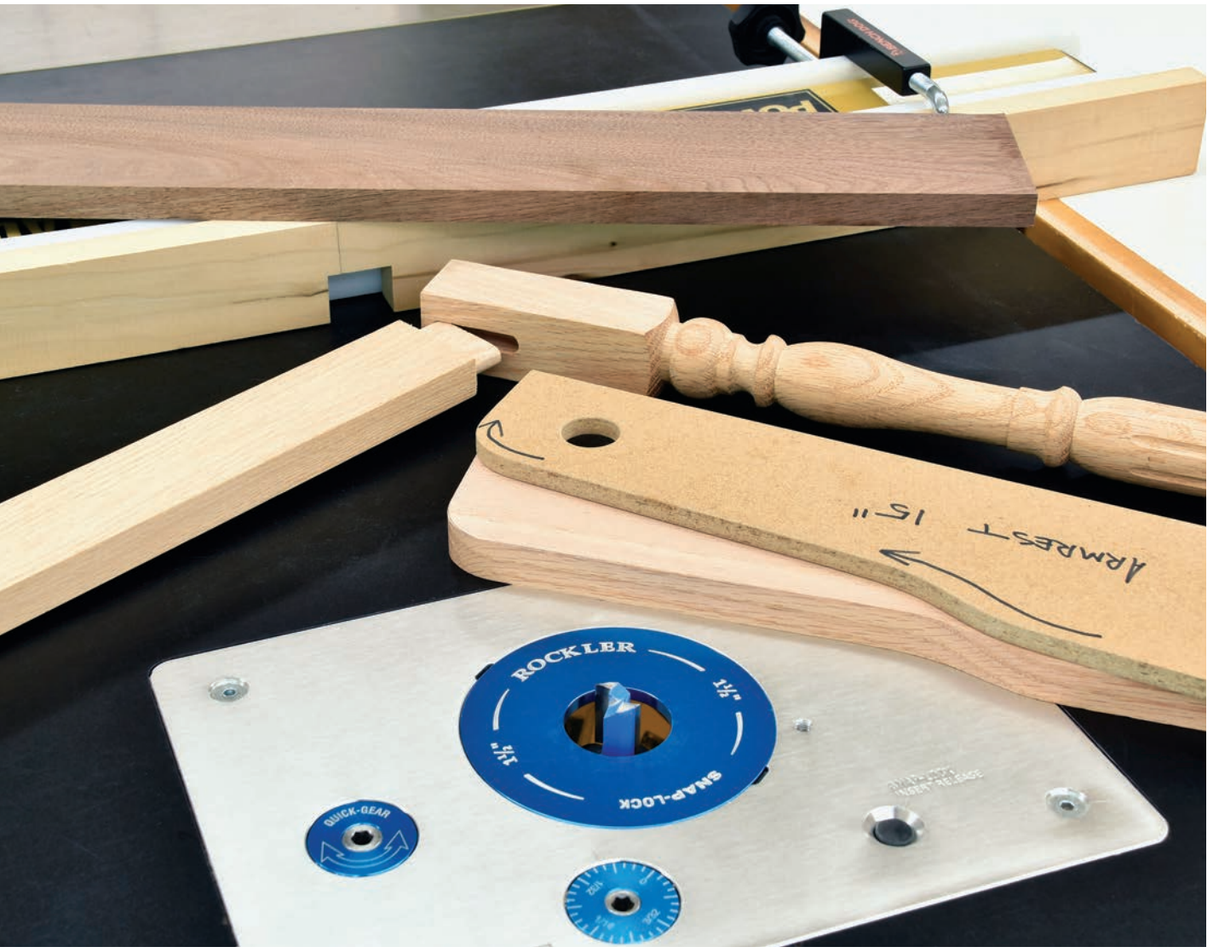
NEW DEPARTMENT

# ADVANCED POWER TOOL TECHNIQUES

## Expanding Your Router Table Operations

By A.J. Hamler

*Table routing with templates, milling mortise-and-tenon joints and using your router table as a makeshift jointer are all ways to extend its versatility in your shop.*




The most frequently used shop tool is probably the table saw, but for sheer versatility the router table makes a good case for taking top prize. Routers handle a huge range of shop chores already, but mounting one under a table kicks their usefulness up several notches.

Once you've become comfortable with the basics of router use, you'll want to take your skills — and your router's versatility — to the next level by using it in a table. Here are three router applications that allow you to do exactly that.

### Template Routing

A router table equipped with a fence makes just about any type of shaping cut you'd want, as long as it's a straight-line cut. But by using a template combined with a bearing-guided bit, you can churn out workpieces in shapes limited only by your imagination. And because template routing is pattern-based, you can shape identical workpieces one right after another.

Router templates can be made of any firm material that will stand up to repeated use. MDF and plywood are top choices. They're thick enough for the bit's bearing to ride smoothly, but not so thick that the extra weight is unwieldy to move around. If they're too thin they can be hard to attach or can get damaged easily. A good range is 1/4" to 1/2".

Cut your template to shape with a band saw, scroll saw or jigsaw, and carefully sand it smooth. Double-check it for accuracy; remember, the workpieces it makes will exactly match the template.

Trace the finished template onto your workpiece, and then rough-cut it to remove most of the waste, taking care to keep your cut just outside the layout line you've traced.

The easiest and fastest way to attach the pattern to the workpiece is with short strips of double-stick tape. (If holes won't show on the final workpiece, you can use brads, pin nails or even screws.) Line the template up exactly with the tracing on the workpiece, and press it into place securely. Don't go overboard on the tape, or the template may be difficult to remove later.

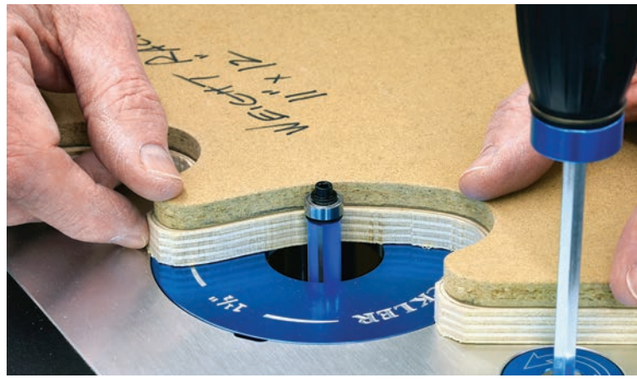
As examples for these photos, I'll first rout the plywood sides for a small hand-weight rack with lots of curves, followed by a solid-oak chair arm.

Install a bearing-guided straight bit into the router. Where the bearing is mounted at the tip (top) or at the shank (bottom) determines how you orient the template. When possible, I prefer a top-mounted bearing as it means the bit only needs to be raised high enough to engage the template.

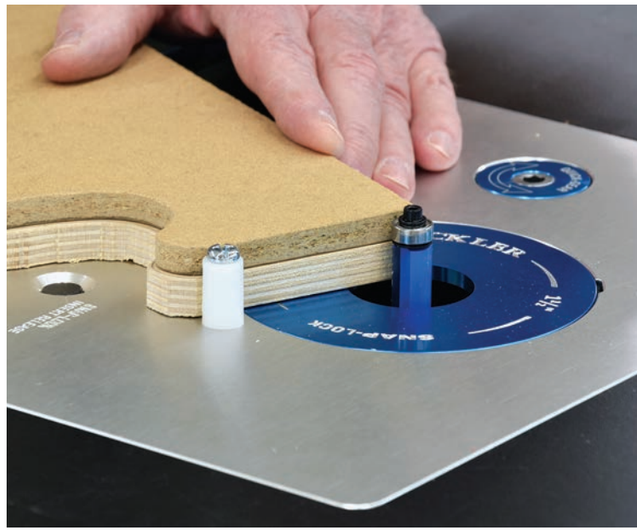
Set the bit height so the cutting edges stop at the template, then insert your router plate's guide pin. Since routing with a curved template is essentially free-hand routing, there's no fence for the workpiece to register against. While it's possible to ease the workpiece into a spinning bit, it's dangerous. Instead, register the workpiece against the pin first, then slowly move it into the bit until it can ride the bearing for the rest of the cut.

Rout smoothly around the pattern, in a single pass if possible. However, for odd-shaped workpieces like this one, you

*After carefully lining up the template with the layout line on the trimmed workpiece, attach it securely with short strips of double-stick tape.*



*Set the bit height so the top of its cutting edges are aligned exactly with the joint between the workpiece and the template.*




*A guide pin (white in photo) is essential to support the workpiece and supply a stable register when beginning the cut. Once started, the workpiece registers on the bit's bearing instead of the guide pin.*

*Rout at a constant smooth speed, allowing the template to follow the bit's guide bearing all the way around the shape in one continuous motion.*

*When template routing solid wood, always orient the workpiece direction so the bit cuts with the grain to avoid tearout. Directional arrows on the template are a good visual reminder.*

*To keep the remainder of the cuts with the grain, flip the workpiece and raise the bit to expose the bit's bottom bearing. (Or switch to a bottom-bearing pattern bit instead.) Once adjusted, finish the routing pass.*


*Pry off the template with a putty knife, starting at one end to loosen it and then peeling the template off. The hole in the template allows it to be hung out of the way until it's needed again.*

may need to stop and reorient your grip to maintain optimal control over the operation.

For that plywood workpiece in the first hand-weight example, I didn't worry about grain direction. But that's much more important with solid wood, like the oak armrest shown on this page. Always rout with the grain, especially around curves, or you can get tearout.

Here, I'm using a combo bit with bearings on both top and bottom. I started routing with the bearing and template on top to cut all the straight edges and curves with the grain. Then, I reset the bit to expose the bottom bearing and flipped the workpiece template-down for the remaining cuts. A combo bit is great for this, but you could also switch from a top-bearing to bottom-bearing bit.

When routing is complete, remove the template. A putty knife pries the template loose on one end, then just peel it up and off. Remove the old tape, and hang up the template for use another day.

## Router Table Jointing

A jointer is great to have, but lacking one due to limited shop space or finances, you can do excellent edge-jointing with a router table.

Most jointers run in the 5,000 RPM range, but routers typically spin four times that. You don't need that kind of speed for simple jointing, so if you have a variable-speed router, cut the speed back. This not only decreases noise but also helps for burn-prone wood like cherry and maple.

*For tasks like jointing, you just don't need the full 20,000+ RPM of most routers. Dialing back the speed cuts noise and reduces potential burn marks on the wood.*

A jointer works by using offset tables, with the outfeed table set to the height of the cutterhead and the infeed table set to the depth of cut. Imagine the jointing on the router table is like tipping a jointer on its side. You can achieve the same basic jointing process by shimming the outfeed sub-fence of your router table fence.

*Commercial router fences usually offer easy ways to shim the left sub-fence for jointing. Typical methods include slip-in shims that go behind the sub-fence or insertable bars that slide in from the end.*

*A narrow strip of general-purpose plastic laminate, about 1/16" thick, makes a perfect shim to offset a shop-made router table sub-fence on the left side of the bit for jointing.*

*With the laminate clamped to the face of the left portion of the sub-fence, use a straightedge to line up the bit with the laminate face. With a conventional straight bit, make sure the cutter is at the apex of its cutting path.*

*With the exception that the workpiece is flat on its face and the cutter is alongside it rather than underneath, the actual edge-jointing process is identical on a router table to that of a dedicated stationary jointer.*

Commercial router table fences accomplish this in one of two ways. Some, like the Rockler fence shown at top left, offer a set of shims that slip down behind the sub-fence. Others use thin bars that slide into grooves to create the offset. The offset isn't large — 1/32" to 1/16".

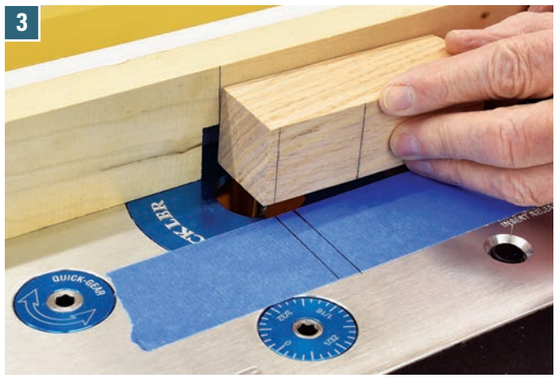
Lacking a commercial fence or having one without a means of shimming, you can accomplish the same thing with a strip of general-purpose plastic laminate (see top right photo), which is about 1/16" thick. Here, on my saw-extension router table, I've made a wooden fence notched to contain the bit and clamped it to table saw rip fence.

Using a narrow wooden caul at the top, clamp the laminate to the face of the outfeed side of the fence near the bit opening. Now, use a straightedge to set the fence so the bit's cutting edge is in-line with the surface of the laminate. Use a straight bit for this setup or, better still, an up-cut spiral bit, as I'm using.

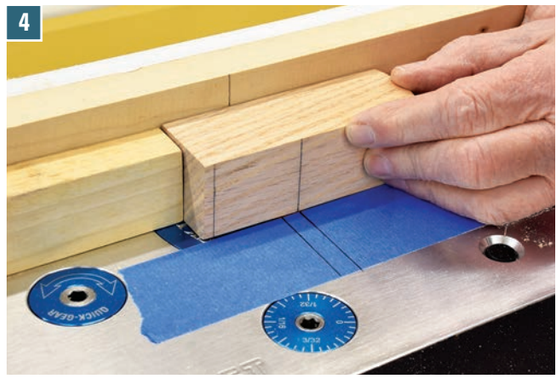
Raise the bit to the appropriate height, and simply run your workpiece along the fence from right to left in a continuous pass as many times as needed. The result: A perfectly smooth, glue-ready edge on par with a jointer.


*Set the fence distance to establish where the mortise will be cut in the workpiece. Rockler's router bit center/depth gauge makes this precise.*


*With the fence set, use a marker to establish the cutting edges of the router bit. The lines represent the forward and rear cutting edges.*




*With router running, carefully lower the workpiece on bit using your markings as guides. Once flat to the table, push the workpiece forward through the first pass over the bit.*




*After making the first pass, raise the bit and make another pass. With the first cut established, a clamped stop makes things easier.*

## Mortises and Tenons

Mortise-and-tenon joints are among the strongest structural joints there are. Tenons, formed on the outer ends of workpieces, can be cut with any combination of table saw, handsaw and chisel. Mortises, on the other hand, are inside the workpiece and require either a dedicated mortiser or some delicate digging out with chisels. As an alternative, you can do both on your router table. For this example, let's cut a mortise-and-tenon joint for a table apron.

Part of the beauty of cutting mortises on a router table is that you can skip most of the layout marking typical with mortise-and-tenon joints. (They'd be on the underside where you can't see them anyway during the routing process.) In fact, all you need are starting and stopping lines for the cut marked on the sides of workpiece, while the side-to-side location of the mortise is controlled by the fence position.

As with jointing, a straight or spiral bit is the choice here. Start by raising the bit above the table to a comfortable working height and set the fence the appropriate distance from the bit to match where you want the mortise to be on the workpiece. In this case, I want the mortise centered in the 2"-thick leg, so locating the fence 1" away from the bit's center point centers that mortise exactly in the middle.

Now, put a short strip of tape on the table surface in front of the bit, and use a straightedge or a square held against the fence and either side of the bit to mark its leading and trailing cutting edges. As a side note, I typically also locate the tape so it underlaps the workpiece as little as possible — sometimes pushing the workpiece over the tape can cause it to peel up at the end and gum up the whole process.

At this point, I like to lower the bit and place the workpiece mark on my leading line, and then mark the fence at the front of the workpiece itself. This gives me not one, but two visual references for the start of the cut — one on the fence at the start of the workpiece and one on the table at the start of the bit.

This mortise will be 3/4" deep, made in multiple passes, so start the bit at 1/4" high. With everything set, turn on the router and, with the workpiece pressed snugly against the fence, carefully lower it onto the spinning bit, aligning everything with the marks. Once the workpiece is flat on the table, a short push through the bit to the second mark routs the mortise from end to end.

Keeping the workpiece stationary on the second mark, shut off the router. As an extra help for controlling the end of subsequent cuts, once the router has spun down I like to clamp a stop onto the fence while the workpiece is still in place. Then, after raising the bit another 1/4", I make the second pass. Once again shut off the router, raise the bit another 1/4" and make a final pass.

Now, prep the router table for cutting the tenons. You can use the same cutter as before and make multiple passes for each face, or replace the bit with something wider. Here, I've installed a 3/4" straight bit and adjusted the fence accordingly to cut each face with a single pass.

Use a backing board to support the workpiece, and make the cuts for the tenon. The backing board adds both safety and accuracy. It keeps the workpiece at 90 degrees to the fence, and makes everything easy to handle securely through the cut, for both the faces and the edges.

Your mortise-and-tenon joint is done ... almost. Since the mortise has rounded ends and the tenon is squared, the parts won't fit. Your choice here is to either square off the inner curves of the mortise with a narrow chisel, or round off the ends of the tenon instead. I've opted for the latter here, but it's up to you.

Once again, that's part of the versatility of the router in giving you multiple ways of getting things done.

*A.J. Hamler writes frequently for* Woodworker's Journal.


*To make the tenon, set the bit to the desired height and create the tenon's faces in two passes over the bit. A backer board adds stability and safety.*


*Turn create the tenon edge shoulders, repeat the process with the workpiece on its edge.*


*A test fit shows that all is good. The round mortise won't accept the squared tenon, of course, but we'll fix that in the next step.*


*To fit the tenon properly into the mortise, the author opts to round off the tenon with a chisel and knife. Alternatively, you can square the ends of the mortise with a narrow chisel.*