In woodworking circles, the lock miter is often referred to as a “trick bit.” By a feat of geometric genius, the bit creates both halves of a mitered corner—complete with interlocking tongues and grooves—with a single router table set-up. In addition to concealing end grain, the joint’s interlocking profile provides a mechanical advantage that offers an increased gluing surface and keep parts from shifting when they’re clamped up. Lock miter bits are frequently used when making boxes, drawers, and other casework. They’re also used for larger projects, including legs and posts. Arts and Crafts furniture makers often employ this bit to craft legs that display quartersawn grain on all four sides.

Despite these advantages, using this trick bit can be tricky. In order for the joint to mate correctly, the setup must be spot-on. The centerlines of the bit and stock must be perfectly aligned, and the fence must be set back from the outer edge of the bit by exactly the thickness of your stock. Machining a joint presents additional challenges. The stock needs to ride tightly against the fence, but overdoing it can damage the delicate corner created by the bit. It’s not surprising that after a few frustrating attempts, many woodworkers retire their lock miter bits.

After experimenting with several different strategies, I came up with my own procedures for a fail-safe bit setup and smooth, sharp-edged parts. The sequence requires some trial and error, but it’s not difficult if you focus on one step at a time. Once your router table’s ready to rout, I’ll show you how to use scrap wood rails to guide and protect mitered edges and ends.
Setting the Bit

Setting the bit requires some trial and error. Plan on milling a foot or two more stock than you might need for test cuts. (For the first time or two, you may want to prepare twice that amount.) Make certain that your stock is flat, straight, and of uniform thickness. Don’t assume that plywood is perfect. Check sheetgoods with calipers before you commit. If the thicknesses vary by even a few thousandths of an inch, the most careful setup will not prevent mismatched corners.

Step 1: Find the center of the bit.
Finding the center of the carbide cutter isn’t as simple as it sounds. If you’re lucky, the centerline will correspond to a carbide corner, but bit manufacturers employ slightly different profiles. Odds are good that the centerline lies somewhere along the edge. In this case, some detective work is in order.

First, make sure that your router is unplugged. Now, draw lines corresponding to the bit’s lower and upper edges on your router table’s outfeed fence. (If your router permits, raise the bit so that you can set the bottom edge of the cutter against a block, as shown above.) Measure the distance between the two lines, divide the amount in half, and then draw a centerline on the fence and the bit. (Note: Don’t erase the lines on the fence. You may need them to redraw a fresh line on your bit.)

Step 2: Center the bit on the stock.
Mark a centerline on your test stock. (To do this, I ran a marking gauge along the top and bottom faces of the board, and adjusted the bar until the cutter made a single line.) Set the piece on your router table alongside the bit. Now adjust the router’s cutting depth so that the two lines meet. (Don’t expect perfection. You’ll use sample cuts to fine-tune the height.)

Pick Your Bit
Lock miter bits come in two sizes: Large (up to 3 1/8” in diameter) bits can tackle stock thickness from ½” to 1 1/4” and cost about $120. Smaller bits (2” in diameter) can miter edges from ½”-thick up to ¾”. This piece of these smaller bits range from $50-$100. Bigger isn’t necessarily better. Larger bits can handle thicker materials, but in order to do so, they require powerful routers (2½-3 hp) that can be slowed down to 10,000-16,000 rpm. The smaller bits should also be dialed back, but can be used on ½ hp routers. One overlooked advantage to a smaller bit is its versatility. When used on smaller projects such as jewelry boxes and humidors (where tight corners count), a lock miter really shines. If you don’t mind milling stock to match the bit’s cutting capacity, or don’t foresee the need to use the bit on stock thicker than ¼” hardwood plywood, you might consider starting out with a smaller-sized bit.

Step 3: Set the fence.
In order for the parts to fit together seamlessly, the bit must create a sharp mitered corner (see the finished cut in Step 4). To accomplish this on the face-to-face fence half of the joint, the distance from the bit’s outermost perimeter to the fence must be equal to the thickness of your stock. Most instructions suggest the “squint, test, reset, reset” approach. My method is a lot easier on the eyes, and nearly failsafe.

To set the fence, simply set your stock against the fence on either side of the bit, and position another board so that it touches the two outside faces and bridges the bit, as shown above. Now, adjust the fence so that the bottom edge of the bit’s cutting edge grazes your bridge. That’s it. (Note: Other instructions don’t mess with the fence until after the bit height is set and tested. However, I find that setting the fence now eliminates the hassle of a second round of test cuts.)

Step 4: Make a test cut.
Before making a test cut, create a pair of rails a couple of inches longer than the test pieces, and attach them flush to the edges of your stock with double-faced tape. Next, set up hold-downs (guide rollers or featherboards) on the infeed and outfeed fences. Now, rest both test pieces flat against the table and feed them past the bit, as shown top right. (Note: The knife-like mitered edge visible in the foremost board indicates that the fence is correctly set.)

Detach the test pieces from the rails and try fitting them together. If they fit together seamlessly, the fence provides a wider balancing point. For both cuts, the rails protect the knife edge, allowing you to exert more pressure on the outfeed end without the risk of crushing the edge or end.

Why Rails?
Rails offer a larger bearing surface. When a board is riding on the table, the rail keeps the piece from tipping into the bit at the beginning or end of the cut. When the mating board is fed with the board’s face flat against the fence, the rail provides a wider balancing point. For both cuts, the rails protect the knife edge, allowing you to exert more pressure on the outfeed end without the risk of crushing the edge or end.

Test Cut Fine-Tuning
Perfect-fitting lock miters almost always require a little dialing-in. Just remember that the error isn’t as big as you might think. Because the bit is used on both pieces, the gap reflects twice the amount that you need to adjust the bit.
Routing the Corners

Now that it’s properly set, a lock miter bit can make quick work of edges or ends. Just as they did during setup, rails make the routing process simpler and safer.

Long (Edge) Joints

Lock miters can help you make legs and other posts; they can also be used with plywood to assemble cases with seamless corners. To make this joint, you’ll rout one piece horizontally with its inner face resting against the tabletop. The mating piece is routed on edge, with its inside face touching the fence.

As you did for the test pieces, create a pair of rails a few inches longer than your workpieces, and attach them flush with the edges you plan to rout. Set up hold-downs on the infeed and outfeed side of your fence, and rout the edge as shown in Photo A.

Without messing with the bit or the fence settings, attach a featherboard to hold the face of the second piece against the router table’s fence. Keeping the edge against the table, feed the piece from right to left (Photo B).

(Note: Routing the joint requires the removal of a lot of material. Chamfering the edge beforehand saves wear and tear on both the router and bit, and produces a cleaner cut.)

Short (End) Joints

Compared to edges, routing ends poses two unique challenges: taming tear-out, and balancing boards when making the face-to-fence cut. Once again, rails come to the rescue.

Using the photos as reference, make the jigs like those shown below. (Note: In order to secure the workpiece and control blow-out, the backers must be the same thickness as your workpieces. Use leftover stock from the setup sequence to ensure an exact match.)

To rout the face-to-fence half of the joint, you’ll need a different jig. I attached a pair of rails to my backer. The upper rail guides the piece through the cut; the lower rail, keeps the workpiece from tipping or shifting. To use the jig, clamp the workpiece between the two rails, and then feed the assembly past the bit as shown in Photo D.

Attach a rail to the backer and use the jig to guide the piece past the bit and control tear-out.

Sandwiching the board between a set of rails keeps it from tipping. The backer prevents tear-out.
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