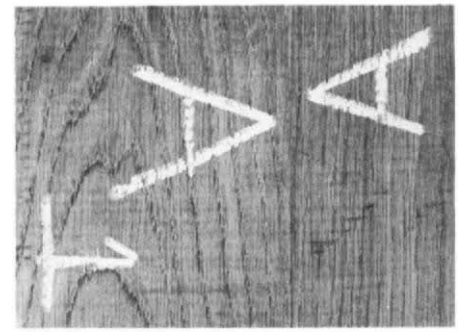
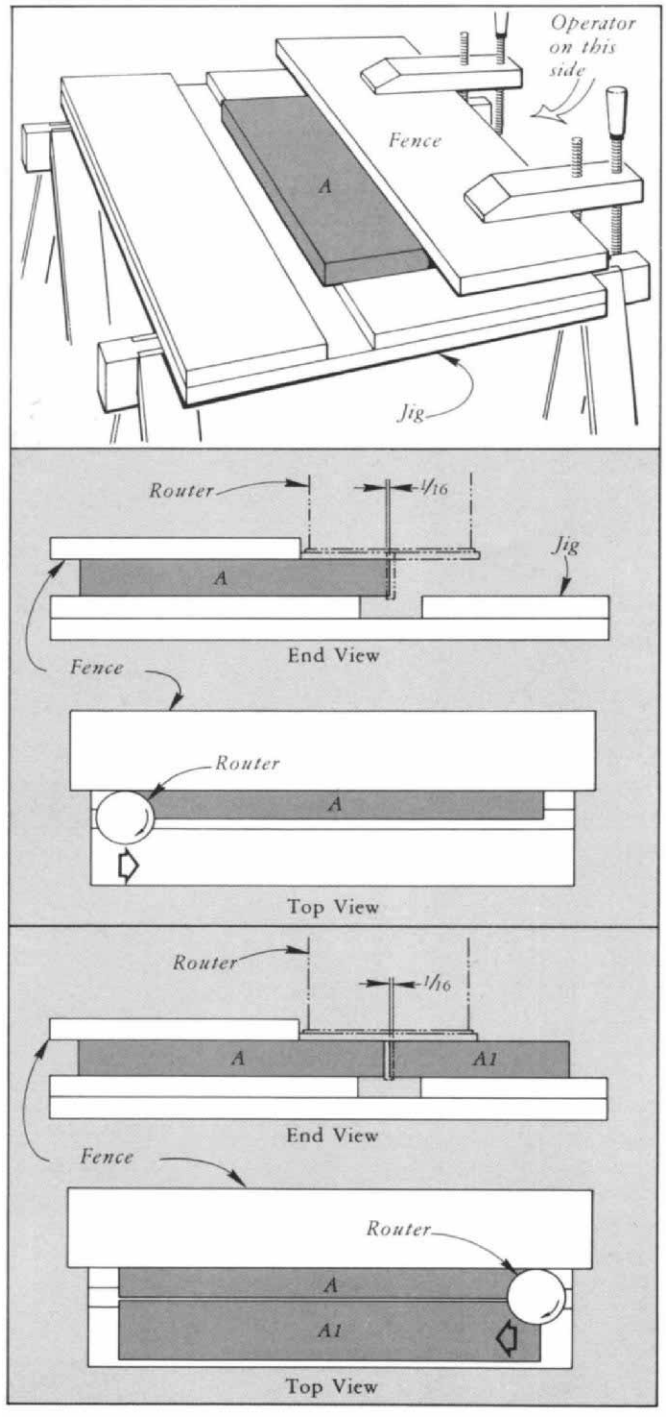
Routed Edge Joint

Fence guides router for seamless fit

by John Harra



Joint is invisible.



A basic task of woodworking is joining two or more pieces of wood to make a wide piece, with no apparent seam, for things like tabletops. It can be a difficult, time-consuming job and one that does not always turn out well. I have developed a system for edge-joining pieces of wood using a router, several clamps, a jig, a ruler and a fence. The results are consistently near-perfect and, with a little practice, can be achieved in a few minutes.

Ideally, two pieces of wood would mate perfectly if they were held edge-to-edge and both edges were cut smooth with a single pass of the router. Any variation from a straight line would be mirrored on both pieces. The router is a most versatile tool, but even at 22,000 rpm it isn't powerful enough to cut that way. My system uses a fence to guide the router along the edge of the first piece to be joined; then the second piece is clamped facing the first and routed against the same fence. Thus any bumps or hollows in the fence are imparted to the first piece and transferred in reverse to the second piece. A hill in one piece will have a corresponding valley in the adjoining piece. The two pieces of wood are perfect mirror images and when joined, look like a single piece of wood.

This router system of edge-to-edge lumber joining can be used to match two pieces with "S" curves or irregular compound curves, as well as straight pieces, as long as the curves are gentle. Thus beautiful grain patterns don't have to be disrupted by straight-line cuts. By joining along the natural flow of the grain, rather than through the grain pattern, you can build a large table apparently constructed from a single piece of wood.

The species and thickness of wood are really not critical. I've routed everything from pine to ebony. Anything from 1/4 in. to 2 in. thick can be routed easily. I have routed 3-in. thick maple using a special bit. With soft woods it is more difficult to get a clean edge because the grain doesn't shear and cut as easily and often rips away. Harder woods have more resistance and break away cleanly.

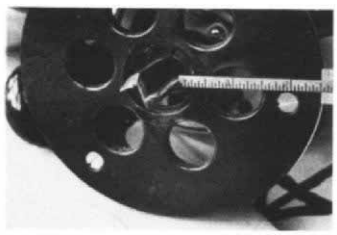
For this kind of routing, a straight bit is used because the two edges to be joined must be perpendicular to the surface of the wood and parallel to each other. Convoluted or fluted bits won't work. Nor will a bit with a narrow cutting area. The cutting surface of the bit has to be at least 1/2 in. in diameter—3/4 in. is best because the peripheral speed makes the smoothest cut with minimum friction. Also, the chips are the right size for the router motor to blow away. With larger bits, the chips are larger and tend to pile up. The bit should be long enough to cut at least 1/4 in. deeper, and preferably 1/2 in. deeper, than the thickness of the wood. The shank size of the bit is important, too. A 1/2-in. shank is pref-

erable. If you have a small router with only a 1/4-in. collet capacity, you'll have to rout very slowly because of the tremendous strain on the bit. If the bit bends—and it can—it becomes eccentric and can whip itself out of the machine.

Now on to the process of achieving a flawless edge joint. You'll need to construct a routing jig to hold the edge of the wood off the bench so the router can cut the entire surface to be joined. Cut a piece of 3/4-in. thick flakeboard, 18 in. wide and longer than the longest boards you plan to join. Glue or nail two more pieces of flakeboard or plywood on top of this piece, one about 6 in. wide and the other about 10 in. wide, leaving a 2-in. space between them. This gap not only allows the router to cut below the surface of the wood, but also provides a path of escape for the sawdust. This is important because unexpelled sawdust can work around the bit, fill up its normal clearance space and cause it to whip dangerously back and forth.

Rest the jig on sawhorses, rather than your workbench. Four large clamps—I prefer wooden jaw clamps—will be needed to hold the lumber on the jig. The routing fence can be made from any piece of 3/4-in. material such as flakeboard or plywood. It should be at least 6 in. wide and at least 4 in. longer than the lumber you'll be routing.

Mark the pieces of wood to be joined *(A-A1, B-B1,* etc.) so it will be easy to identify matching pieces. It's best to match all the lumber you'll need for the whole tabletop first, and then join it together. Take either piece from a pair to be joined and place it—let's say it's *A*—on top of the jig so that the edge to be routed is over the slot in the jig. Then place the fence on top of *A.* The key to the operation is the distance between the leading edge of *A* and the front edge of the fence. It must be a little more than the distance from the cutting flute of the router bit to the outer edge of the router base. To determine this distance, first insert and tighten the router bit. (Be sure the router is unplugged and the off-on switch is off.) With a ruler flush against the bottom of the router, rotate the bit by hand so that it just ticks the end of the ruler, and read the distance to the edge of the router base. The distance varies from router to router, but let's say it's 2-1/2 in. The fence is then clamped down at both ends so that it is exactly this distance from the edge to be routed plus 1/16 in. This means the router will be cutting away 1/16 in. from the leading edge of the lumber.



To begin routing, stand between the clamps with the fence in front of you. Hold the router with the left hand and turn it on with the right hand. Place the router flat on piece *A* with the bit just off the wood to the right. You will rout from right to left so that the blade, which is rotating clockwise when seen from above, is cutting into the wood. Holding the router firmly, bring it toward you against the fence, and move it slowly into and along the wood from right to left.

After routing *A,* turn the router off and leave *A* clamped in place. Place the adjoining piece of wood, *A1,* on the jig so that the edges to be joined are facing each other and separated by the diameter of the bit (in this case 3/4 in.). Now, move piece *A1* 1/16 in. closer to piece *A*—the amount of wood you will remove from *A1.* Clamp *A1* down and check both ends to be sure that the distance from *A* is exactly the diameter of the bit less 1/16 in. If the gap is too narrow, the router may stall. And if you have to interrupt the cut, you are almost certain to ruin it.

Operator guides router along fence from his left to right to cut 1/16 in. from second piece of wood.

Now turn on the router and, standing in the same position, place it at the left end of the jig, with the bit just off the edge of the wood. You'll be routing from left to right this time. The router rests on both *A* and *A1,* and is held against the fence. In this position it will cut off 1/16 in. from *A1,* but nothing from *A.*

After you've finished routing *A1,* turn the router off. Unclamp *A1* and bring it forward to *A* (which is still clamped in place) to check for errors. If the pieces don't quite match, you can rout another 1/16 in. If there are gaps, you haven't routed deeply enough. If the pieces have been routed correctly, there is only one position in which the boards will join. When the right alignment is found, the seam will virtually disappear. Pencil a fine line across the joint to help match the pieces again when you're ready to glue them.

The same procedures can be used to join wood along curves. Visually match the grain of the pieces to be joined. Mark the faces of the pieces *P* and *P1.* Draw the desired cutting line on *P* and using a band saw, sabre saw or hand saw, cut along this line. Place *P* over the mating piece *P1.* Trace along the line you've cut and cut piece *P1.* You'll now have two roughly-mated pieces. Again using *P,* trace along a new piece of wood to be used as a fence and saw along this line. Follow the same procedures for setting up the wood and routing as for a straight-line joint. Curved edges routed in this manner will not be perfect mirror images, especially when the curve is severe. But a slow curve or a gentle "S" curve will fit together nicely to form a clean joint.

Flaws in this system are caused by flaws in the wood. Avoid severely twisted wood, narrow boards and wood with knots. Cupped or bowed wood can be clamped flat for routing and planed level after glue-up. Rout the flatter board first, tacking a piece of plywood on top of it to obtain a stable surface. Finally, a word about grain. What you have to do is stop and think, which way is the grain going? Then if the router is tearing it up flip the wood over to reverse the grain.

John Harra, 33, owns the John Harra Woodworking Studio, a cabinetmaking shop and school in New York City.