

The Dowel Joint

Use a simple shopmade jig to create cabinets that stand the test of time

BY DAVID WELTER

The strong and unobtrusive dowel joint has earned its place in woodworking history. For cabinets, the technique can provide a joint as strong as other methods and has the advantage of being accessible to shops of modest means.

Doweling is an excellent technique for both solid wood and veneered carcasses. The key to good doweling is accuracy. I've had success using James Krenov's approach to doweling, which uses a shopmade doweling jig. It is accurate, of negligible expense, and adaptable to many situations.

What kind, how many, and how to get a perfect fit

A properly fitting dowel should slide into its hole with a feeling of friction but should not need to be driven into place.

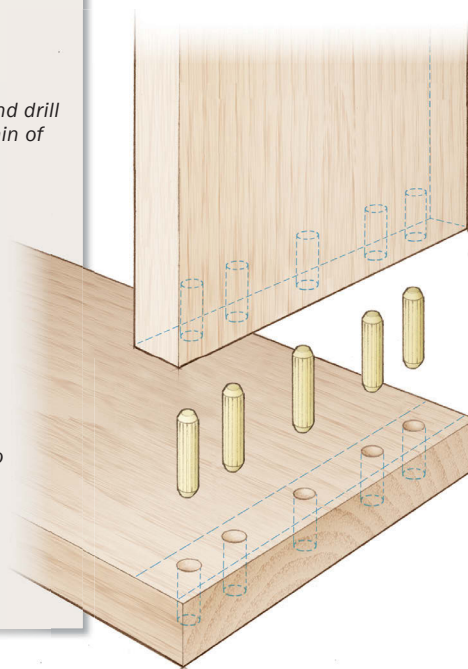
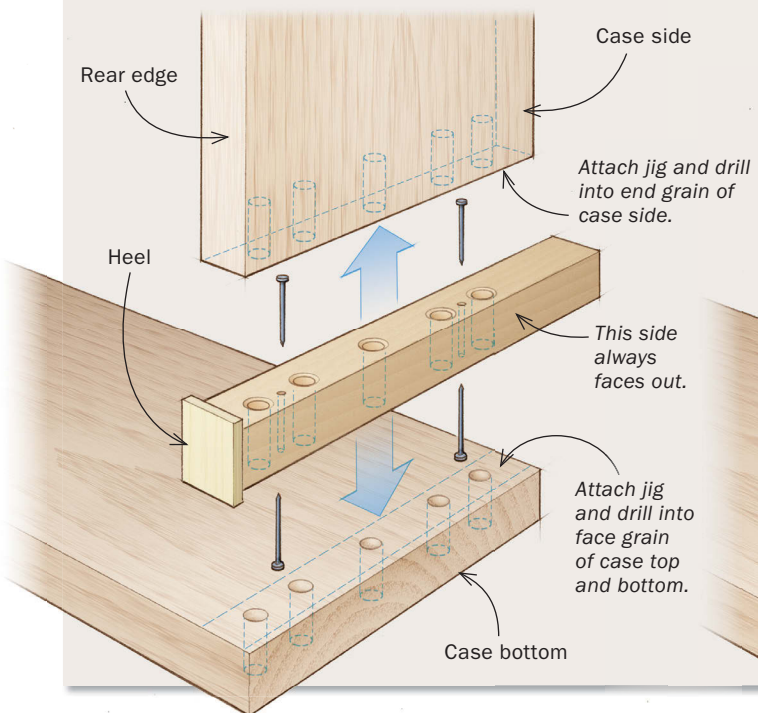
First, choose an appropriate size and number of dowels. The diameter of the dowel should be from one third to half the thickness of the end-grained stock. By locating dowels closer together at the outside edges and spreading them out in the middle you can counter the tendency of a joint to open at the ends. Lay some dowels across the workpiece to get a feel for the number and spacing.

Depending upon the wood being used, the same drill bit may produce different-size holes, especially when drilling into end grain as opposed to face grain. Choose a drill-bit size by experimenting with scrap stock, boring holes in both face and end grain. If there's a variance, make sure the dowels fit well in the larger

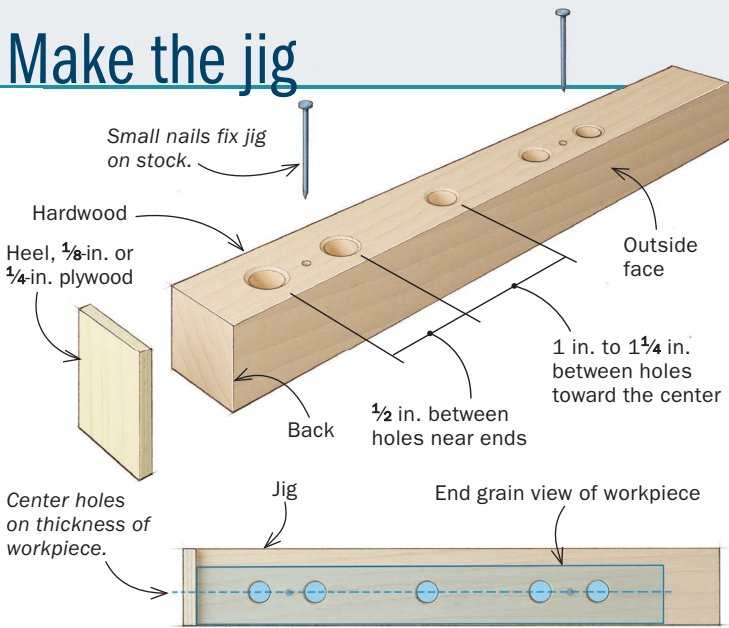


ONE JIG DOES IT ALL

A simple stick of scrap with a fence, or heel, at one end and holes cut on the drill press is the only jig you'll need. Always have the jig's outside face turned toward the outside of the workpiece, and hook the jig's heel over the back edge of the workpiece.



Make the jig



Attach the heel. The jig can be made of any hardwood. Add a $\frac{1}{8}$ -in. to $\frac{1}{4}$ -in. plywood heel to the end of the jig. This will act as a hook to align the jig on the workpiece from the back. Welter chamfers the end of the jig before attaching the heel. This will help keep crumbs from catching in the corner and causing misalignment.

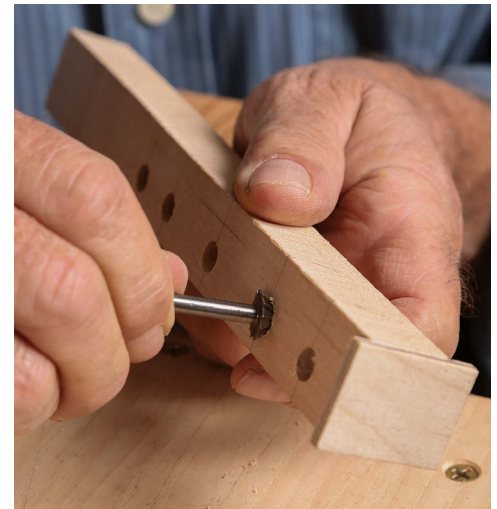
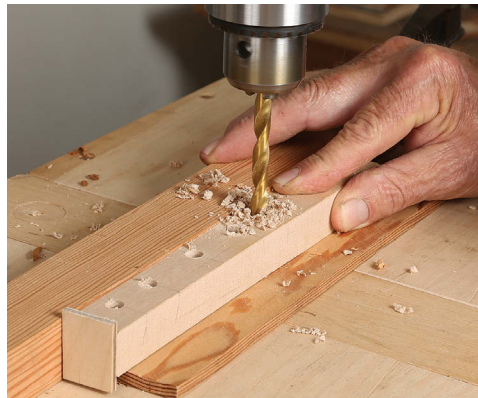


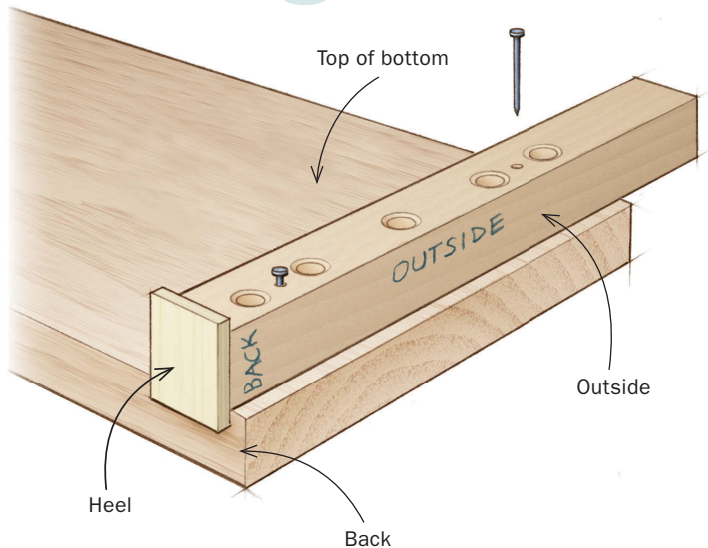
Figure out the spacing. Hook the jig on the workpiece, spread out the dowels, and mark their placement on the jig. Keep the spacing closer at the outside edges, about $\frac{1}{2}$ in. Spread the spacing out to 1 or $1\frac{1}{4}$ in. toward the center. Drill the holes through the jig on the drill press, positioning them so they'll be centered on the thickness of the workpiece. Then chamfer their edges slightly.



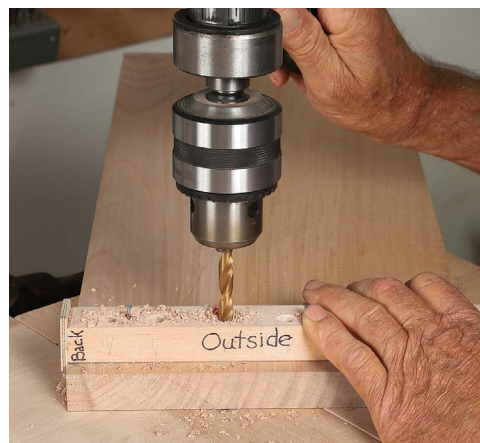
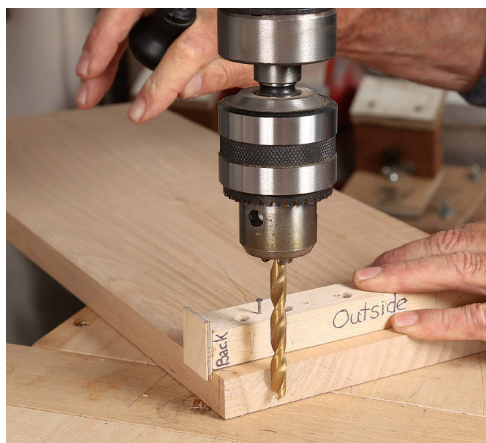
Nails hold the jig in place. You'll affix the jig to the work with two small wire nails or brads. With the jig at the drill press, drill clearance holes for the nails sized to create a little friction, but allow no play.

Drill the dowel holes

Face grain



Attaching the jig. Because the case sides are inset, Welter registers the outside of the jig to a layout line, not the end of the workpiece. He hooks the heel over the back and tacks the jig to the workpiece, leaving the nails proud so they're easy to remove.



Drill and chamfer. Make sure to set the depth stop so you do not drill through the opposite face. For accuracy, drill slowly. Afterward, chamfer the holes to remove crumbs, which may interfere with the joint.

of the holes. The dowels can be sized with a file to fit into the tighter holes. Letter drill bits have sizes slightly larger and smaller than fractional sizes, affording better fits. In a pinch, I have reduced the size of stock bits with an oilstone while running the bit on the drill press.

The doweling jig itself

A doweling jig is a drill guide that is used to repeat the same hole pattern in joining parts. One end and one side of the jig serve as reference points. Understanding the relationship of the jig to each side of the joint can be confusing at first. Think of the jig as being sandwiched between the two parts of a joint. Dowel holes will be drilled from each direction through the jig to create one joint. The nails that locate the jig will be driven through one side of the jig for half of each joint and through the other side for the other half.

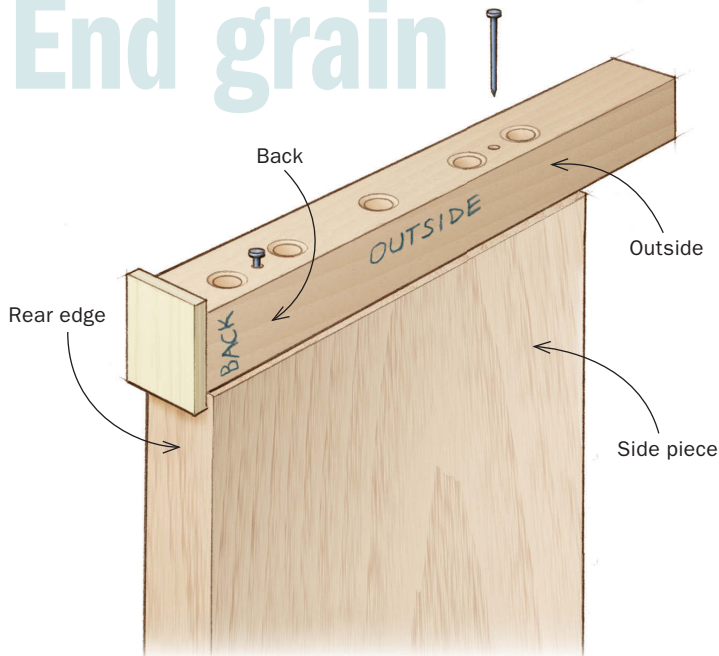
When making the jig, choose a width that is greater than the thickness of the carcass stock. That makes the jig's reference edge readily evident because the holes will be closer to one edge than the other. Visual clues such as this can go a long way in avoiding confusion. A bandsawn non-reference edge serves the same purpose.

Glue a plywood heel on one end of the jig. It will serve as a fence to align the back edges of the two workpieces being joined. Keep the heel short, protruding no more than $\frac{1}{4}$ in. beyond the face of the jig. A heel that's too long may amplify a small variance.

Drill the holes in the jig

Mark the hole spacing on the jig based on a visual layout. The spacing can be casual; precise measurement is of no consequence because the layout, whatever it is, will be duplicated with the jig. On a drill press, drill the holes in the jig that will keep the jig

End grain



Use a depth stop. A wooden block with a through-hole is the perfect way to mark the depth of the dowel hole. Place it on the drill bit, taped to the chuck. The stop is more reliable than a piece of tape on the bit, which can be bumped upward when it contacts the doweling jig. A few such bumps can make the difference between success and disaster.



Drill into the end grain. When drilling into the end-grain elements, hook the jig on the back edge with the jig's reference face toward the outside (above left). While drilling, keep the bit plumb (above).

in place on the workpiece. The through-holes in the jig may be drilled at the same time as the first set of face-grain holes. That will keep the jig in place on the workpiece.

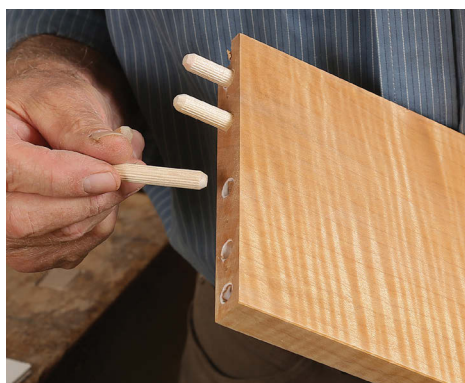
Attach the jig to the workpiece with the two small wire nails. While the heel of the jig aligns the back edges, one long edge of the jig establishes the relationship of the faces of the stock to be joined. I typically reference to the outside, so the jig is always referencing off the back and to the outside of each workpiece.

Drill the dowel holes

Generally, the depth of a dowel hole drilled into face grain should be $\frac{1}{8}$ in. less than the thickness of the stock. Working any closer creates the possibility of evidence of the hole being telegraphed, and, at worst, poses the risk of exposing the holes in the show side when finish surfacing the stock. If you are using a brad-point drill bit, be sure to consider the point as the bottom of the hole.

Assembling a doweled case

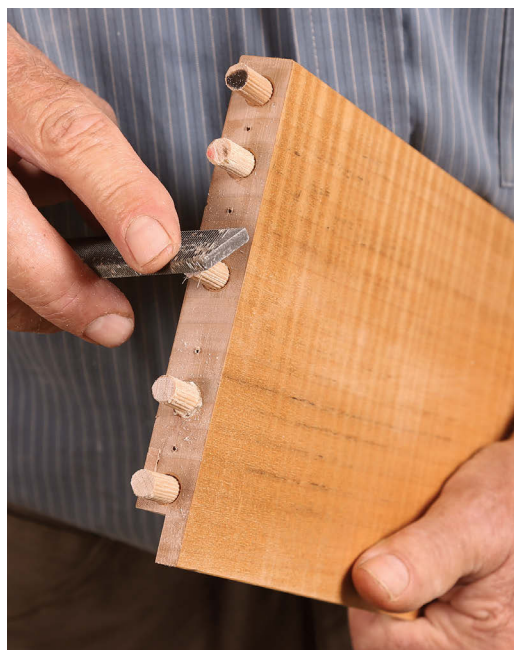
Gluing up dowel joints is a low-stress job if you prepare well. Test the fit and adjust and dry-fit again before you even look at the glue bottle.



The first step. Glue the dowels into both ends of the side pieces.



Measure depth and transfer. Measure the depth of the holes in the top and bottom pieces, and transfer that depth minus $\frac{1}{16}$ in. to the dowels in the side pieces.



Cut dowels to length. With the dowels glued into the workpiece, crosscut them to length using a miter gauge. Then file a slight chamfer around the tips, making them easier to fit. Confirm that the dowel holes in the face-grain parts are about $\frac{3}{16}$ in. deeper than the exposed dowel length. Welter uses fluted dowels, which will expand when glue is applied, ensuring a tight joint.

The hole in the end-grain part should be deep enough to firmly locate the dowel, about 1 in. deep.

The sides of this cabinet are inset, so when drilling the dowel holes in the carcass top and bottom, instead of referencing the jig to the ends of those parts, I used lines on them representing the outside face of the sides. I made marks on one piece, squaring from the back, then transferred them to its mate by aligning the two along their back edges with the interior faces up. In more advanced work, the reference lines may not be square, but the principle is the same if the sides of a cabinet are angled. In this case, the reference end of the jig would be angled to match. Hook the heel of the jig onto the back edge of the face-grain stock, aligning the reference edge of the jig with the established reference lines. Drive the nails through the jig into the workpiece just far enough to hold firmly, leaving the heads free so the nails can be pulled out easily. I drill the face-grain holes on the drill press, using the stop to carefully

set the depth. Remember to roll the doweling jig over when drilling the other end of the same part.

Drill the end-grain holes by hand

I drill the end-grain holes with a hand drill and a wooden drill stop that positively limits drill depth. When drilling into the end-grain piece, hook the jig again on the back edge with the jig's reference face flush with the stock's outside face.

Once all the dowel holes are cut, you'll assemble and take apart the carcass several times before the final glue-up. To avoid enlarging the dowel holes through repeated fittings, temporarily place slip-fit dowels in the second hole from each end until glue-up time approaches.

Get ready for glue-up

After the doweling and any other machining is completed, start preparing for glue-up. Plane, sand if necessary, and finish all of the in-

Test the fit first. Before gluing up, Welter pre-finishes interior surfaces as well as the exterior of the sides. The exterior surfaces of the top and bottom will still be accessible after glue-up. He does a dry-fit to make sure all the joints are coming together perfectly, and then glues and clamps the case together.



terior surfaces and the exterior of at least the long-grain parts.

A clean joint looks good from every side. To help ensure that no gap appears at the end of the joint, plane a slight, long hollow into the butt ends. The hollow should be only a hair ($\frac{1}{64}$ in. or so), enough to ensure that the ends of the butted cut contact the surface of its mate before the center does.

Glue the dowels into the long-grain parts first. Because the holes are deep here, the dowels will be well seated. Apply a healthy drop of glue to the holes only, spreading the glue with a bamboo skewer.

Before applying any more glue, do a dry run of the final glue-up. The fewer the surprises, the greater the likelihood of success. Padded clamping blocks will disperse clamp pressure. Check for squareness with diagonal sticks or measurement. Remove the clamps when the glue has cured, admire your project, and get busy on the next step. □

Retired after 30 years at The Krenov School, David Welter builds furniture in Fort Bragg, Calif.

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