

BISCUITRY

Biscuit joinery is so fast and easy it almost seems like cheating. And boy, I have tell you, I'm no cheater. Consequently, I pretty much ignored the system, sticking with more traditional joinery even when I worked with sheet goods.

A few years ago, I was introduced to a novel (to me, anyway) post-and-panel construction. The posts and rails were joined with loose tenons, and flat, veneered medium-density fiberboard panels were joined to

the posts and rails with biscuits. The whole point of this construction is to reduce production cost by reducing the labor.

Since then, I've used biscuit joinery to build tool chests, a router table, bookcases, wall cabinets, and a lot of other furniture. All are pieces built primarily of plywood, and I had to complete all of them without sacrificing strength or appearance.

Speed and economy are the whole point of biscuit joinery.



The biscuit joiner is a single-purpose tool, invented in the 1950's to cut a joint that didn't exist. It was designed specifically to make strong joints very quickly in manmade sheet materials, such as plywood, MDF and melamine.



Biscuitry Basics

For the uninitiated, a biscuit joint is a butt joint splined with a small beech wafer, called the biscuit. Simple in appearance, biscuits are fairly sophisticated. Shaped like tiny, flattened footballs, they're stamped out, a process that compresses them. Add moisture and they swell up.

The linchpin of the biscuiting process is a dedicated portable power tool known as a biscuit joiner. The tool enables you to plunge a cutter into your workpiece to make a slot that will, unsurprisingly, accommodate a biscuit. Well, half a biscuit.

To make a simple biscuit joint, you cut a slot into each mating surface, insert a biscuit into one slot, then slide the mating part into position. As you close the joint, the protruding biscuit half penetrates the second slot, providing a mechanical connection.

At this point the reason biscuits are compressed becomes clear. When you use ordinary white or yellow glue, the moisture in the glue prompts the biscuit to swell, and the biscuit locks itself in the matching slots, strengthening the joint. (If you use polyurethane glue or an epoxy, you should dampen a biscuit as you insert it in its slot.)

The result is a joint that's easy to produce, invisible and surprisingly strong. Biscuits can be used to reinforce — to spline, in effect — almost any butted joint. One qualification: The contact surface between the mating parts must be thick enough and wide enough to accommodate one of the three common biscuits, which are #0 (the smallest), #10 and #20 (the largest). The most common biscuit joints use multiples, arraying them in a line across a wide joint or stacking them in thick stock.

Biscuits are most appropriate, in my opinion, in casework produced from sheet goods: plywood, melamine, veneered MDF and the like. Often, sheet



The biscuit is engineered to swell and seize in the mating slots when dampened with a water-based glue. Just a quick dip in water, and the grid and other markings pressed into the biscuit's face disappear.



Biscuits are made in several sizes. The three most common — simply because all biscuit joiners can produce slots for them — are the #20 (largest), the #10 and the #0 (smallest).

goods are selected for a project to circumvent lumber prep and panel glue-ups, to shorten the production time in other words. So a joinery that also shortens production time — without sacrificing strength and accuracy — is appropriate.

Layout and Slot-Cutting Tips

Many of the benefits of biscuit joinery as a process derive from the tool used. It has only one purpose — cutting slots for biscuits — so it's always set up for operation, and there are no bit changes, no jig setups and usually no cutter adjustments. Once in a while you may adjust the machine for a different biscuit size. This involves nothing more than a twist of a small knob to change how deep the cutter plunges into the work.

The tool has two reference surfaces: the base and the fence. Every joiner is designed to locate the center of the slot $\frac{3}{8}$ " from the base, which centers the slot on the edge of $\frac{3}{4}$ " stock. There are registration marks delineating the vertical center line of the slot on the tool's nose, its underside and its fence.

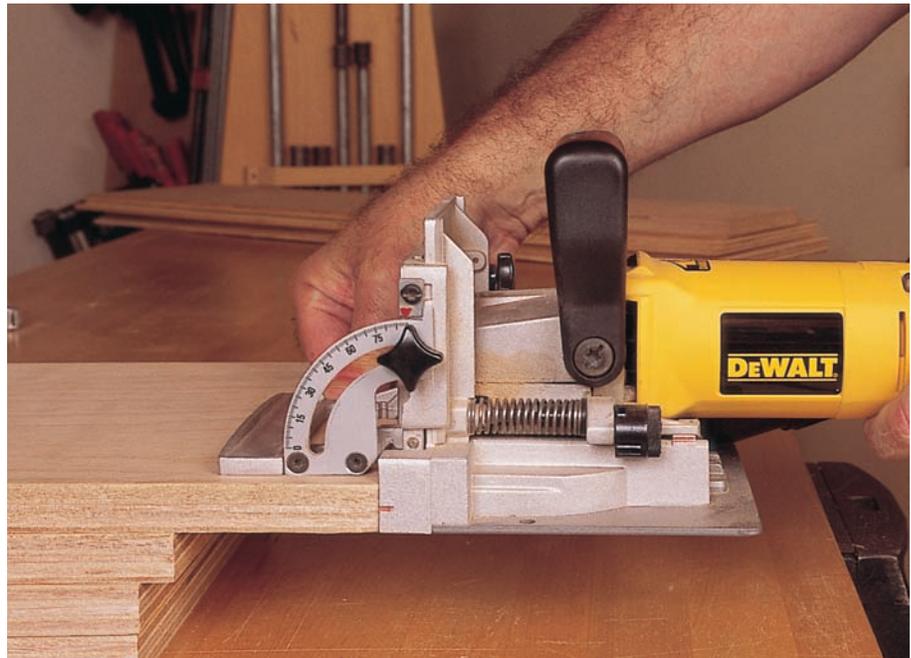
Fence designs vary from model to model. Some are easily and precisely adjustable and others are not. You should be able to adjust the angle of the fence and its elevation above the blade. Just bear in mind that not all fences are perfectly aligned with the cutter and not all will stay locked.

Rule number one is to always use the same reference surface for slotting both parts of any joint. On the tool, I think your first choice should be the base, simply because the machine design virtually guarantees it to be accurate. It's easy to hold the tool steady when it's resting solidly, squarely on its base, less so when it's hanging from the fence. Keep in mind, too, that the nose of the biscuit joiner must be square to the surface being slotted. If the slot isn't cut square to the surface, the joint won't line up.

If you have to shift the location of the slot, use a shim under either the tool or the work. You'll find, as I have, that you can orient the work and the tool so you can use the base as the reference to produce slots for any form of biscuit joint.



The base is a reliable, stable reference surface. The distance between the base and the cutter never changes; it can't creep out of adjustment. Moreover, you are least likely to rock the tool when it's resting on its base and both of your hands are gripping it.



Many users favor the fence as the reference surface because it can be adjusted to accommodate different stock thicknesses or to locate a slot off center. Because it's so easy to inadvertently tilt the tool when registering the cut with the fence, I tend to hold the fence against the work with one hand while operating the tool with the other.

On the workpieces, use the surface that must line up in the final assembly as references. For example, you need the top surface of a case top to be flush with the top edge of the case side, and you want to use the biscuit joiner's base as the reference. To do so, slot the top with its top surface down on the bench top, and slot the side with the joiner's base flush with the side's top edge.

How do you accomplish the latter? One good way is to butt the side's end against a "fence" held in a bench vise. Stand the joiner on its nose, base against the fence and make the cut.

Layout couldn't be simpler. Place the parts together, just the way you want them in the assembled joint. Tick across the seam to mark the center of each biscuit slot on the mating pieces. Align the joiner's registration mark on the tick to cut the slot. Typically, that's all the layout that's necessary. Occasionally, you have to extend the tick across an edge or onto a face so it's visible when the joiner is in position to cut a slot. You don't need to address the slot's vertical position because that's determined by the tool's fence or base.

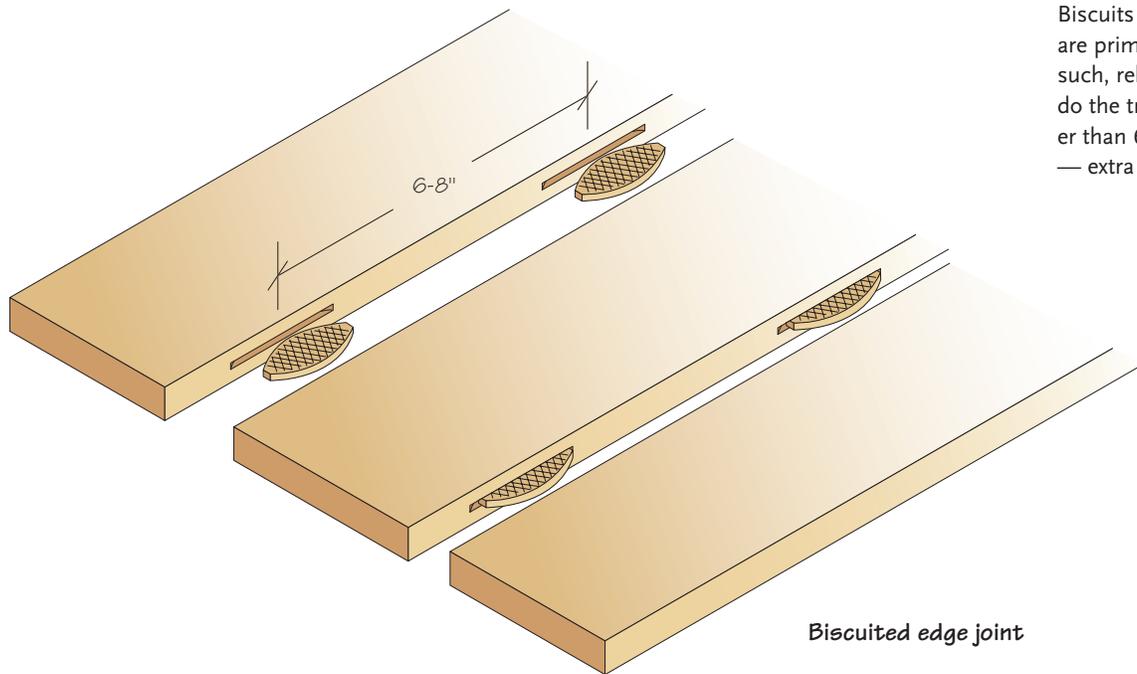
In a wide joint — joining a bottom to a side in a 2'-deep cabinet, for example — you need to use several biscuits. The rule of thumb is to space biscuits 6" to 8" apart on center. Offset the end ones about 3" from the edge of the workpiece. You can do this by measurement, or you can simply eyeball the locations.

Stacking slots is common when the thickness of the working stock exceeds 1". If your material is a uniform thickness, you can cut a slot, then roll the piece over and cut the second. The hazard here is the odd piece that's thicker or thinner than its mates. The sure approach is to use that shim under the joiner base to elevate it when cutting the second slot.



When stock thickness tops 1", you should stack biscuits. You can clamp the workpiece to the bench and cut the lower slot, then raise the joiner with a shim and cut the upper one. In bulkier frame stock, you can stack three biscuits.

An Edge-to-Edge Glueup



Biscuits in edge-to-edge joints are primarily alignment aids. As such, relatively few of them will do the trick. Spacing them closer than 6" on center is overkill — extra work with no benefit.

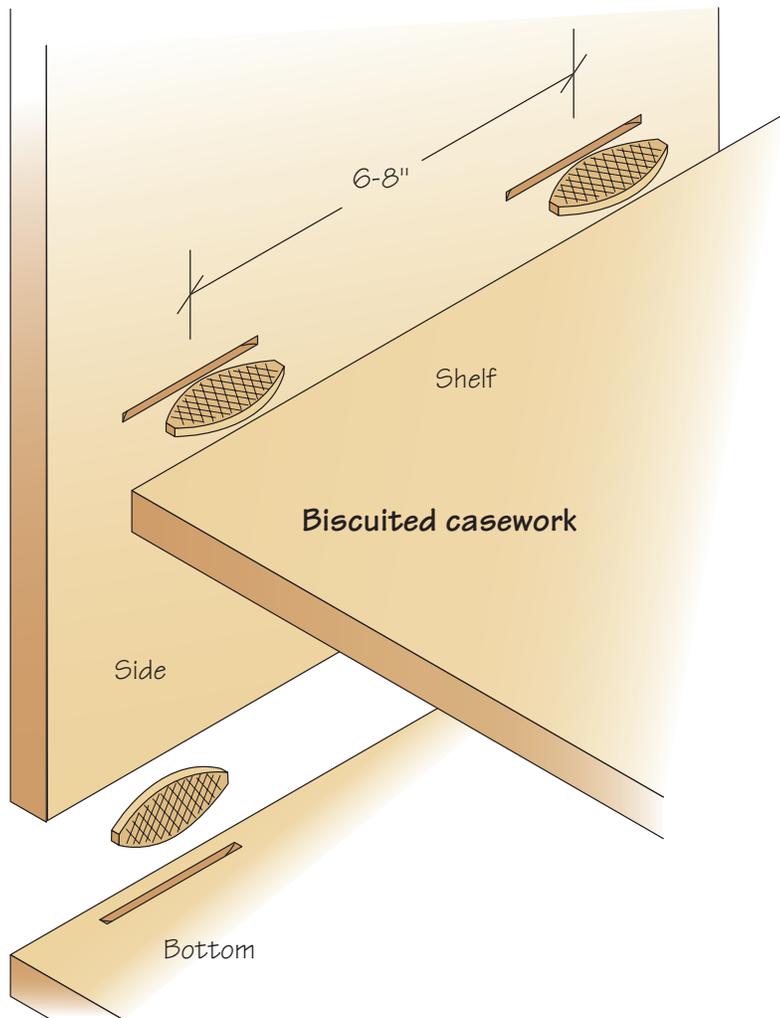
Biscuited edge joint



Biscuits offer a fast, reliable system for aligning the boards in an edge-to-edge assembly. Butt the mating boards and slash across the seam between them every 6" or so (above). You *can* lay out the marks with a tape, but there's no reason for anything other than a guesstimated layout. You can situate the slashes any way, at any angle, curve or other, because you'll only reference the joiner right at the edge. The slots you cut in the mating edges will align (right).



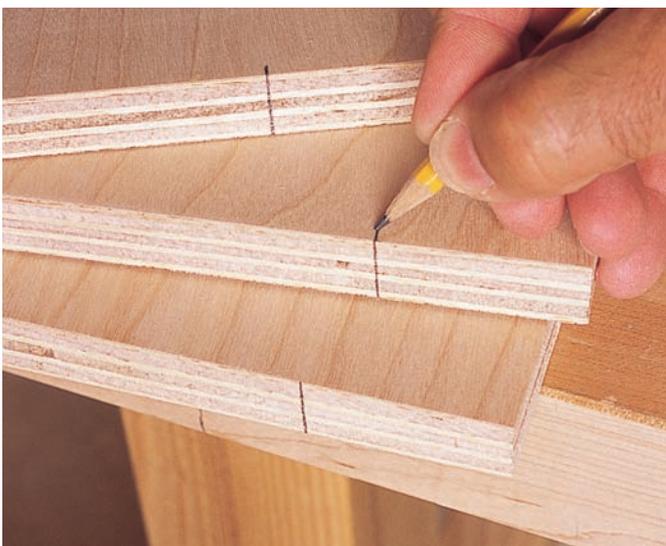
Casework



Case construction of manufactured materials such as plywood, MDF and melamine is what biscuit joinery was invented for. With biscuitry, all joints are in effect butt joints. Parts are easy to dimension, and the required slots are easy to lay out and cut.



For a simple case like a wall cabinet with two sides, a top and a bottom, and two or three shelves, mock up the assembly and mark slot locations on sides and shelves at the same time. Square up a shelf in position, as shown, and mark the center of the mating slots on the face of the side and the shelf.



For a large unit or multiple assemblies, you can lay out edge slot locations on a stack of like parts. Use a square and extend the lines across the edge of the stack. Then extend the line onto the faces so you will have a visible reference for the joiner.



Free both hands for the biscuit joiner by clamping a block to your bench and butting the part against it. After cutting the slots in one edge, simply spin the workpiece 180° and you're ready to slot the opposite edge. Clamp handling is eliminated; production is accelerated.



You can align the biscuit joiner in several ways for a face cut at the end of a panel. You can use the tool's fence (top left), but plunging the tool when it's overhanging the edge is likely to rock it, so this isn't my favorite option. Better is make a jig to hold at the end of the panel so the joiner base can reference it (above). This puts the nose of the tool square on the panel, making it more stable during the plunge cut. A third option is to grip a vertical reference piece in a bench vise, then butt the panel to be slotted against it and clamp it (left). This allows you to grip the tool with both hands.

Clamp a fence across a case part to position the joiner for cutting face slots. Mark the line of intersection between the parts — for example, a shelf and a case side — and plant your fence on the line. Stand the joiner on its nose, its base against the fence, and cut the face slots. In some situations, the fence can be the actual mating part. Stand the part in place, mark slot locations on it and its mate, then lay it flat and clamp the two parts. Rest the joiner on the flat to cut the edge slots; stand it on its nose, base against the fence, to cut the face slots.



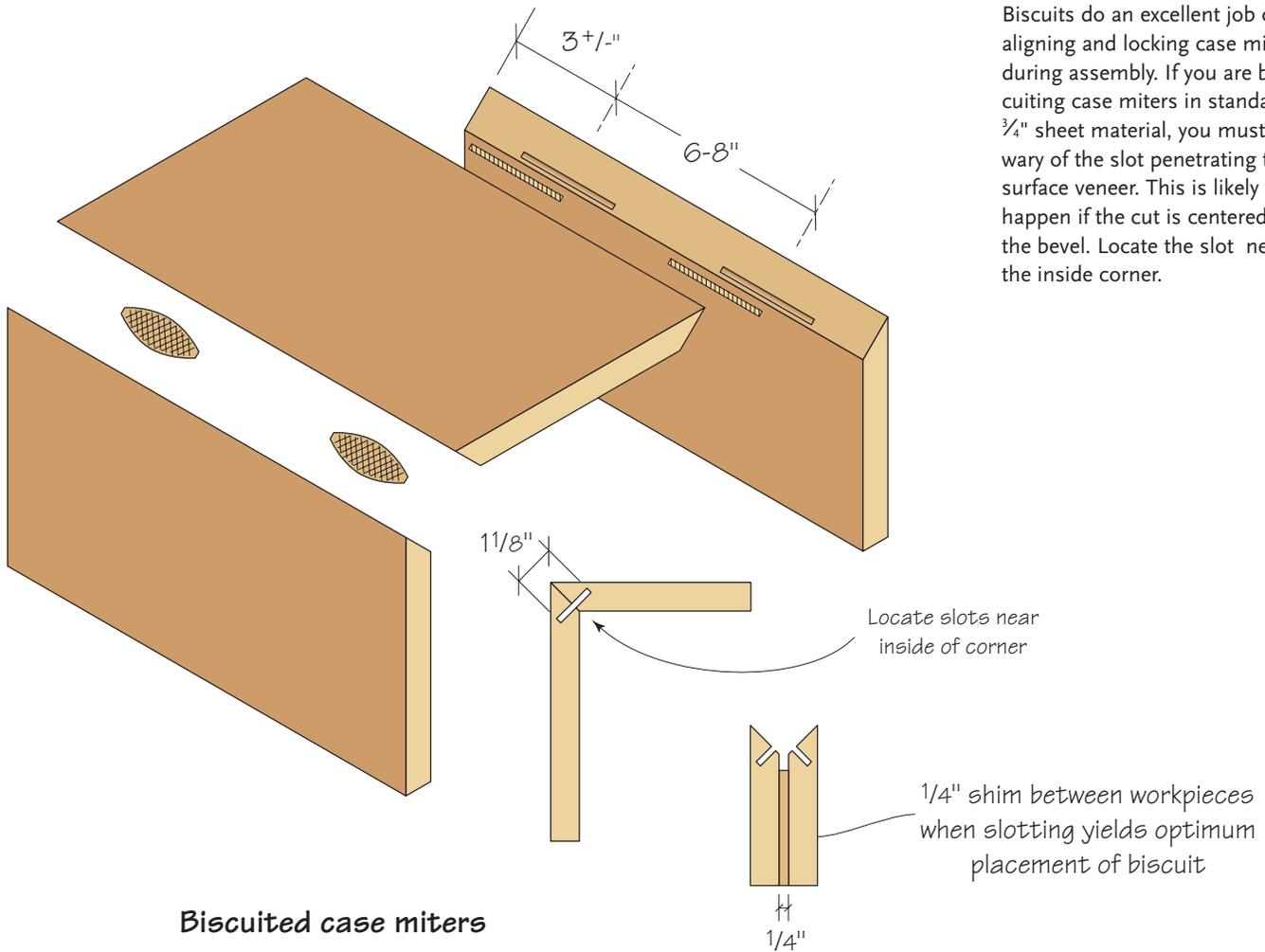
STEP-OFF GAUGE



A step-off gauge is a time-saving jig that helps locate and cut repetitive slots in casework. The length of the gauge equals the distance from the bottom of one shelf to the bottom of the next. Cut face slots across its bottom edge, and use biscuits (without glue, of course) to mate it to the first row of slots in a case side. The top edge of the gauge becomes a fence and a layout guide for cutting the second row of slots. Step the gauge to mate its biscuits into the newly cut slots, and again, use it as a fence to cut the third row of slots.

The board is especially useful when you're crafting a set of bookcases, or any other project that requires making multiple sides and cutting rows of slots a uniform distance apart. But it can be helpful just ensuring that rows of slots in a pair of case sides line up. If the spacing between shelves is not uniform, you can begin with the widest spacing, then cut down the gauge in stages as you progress to the narrowest spacing.

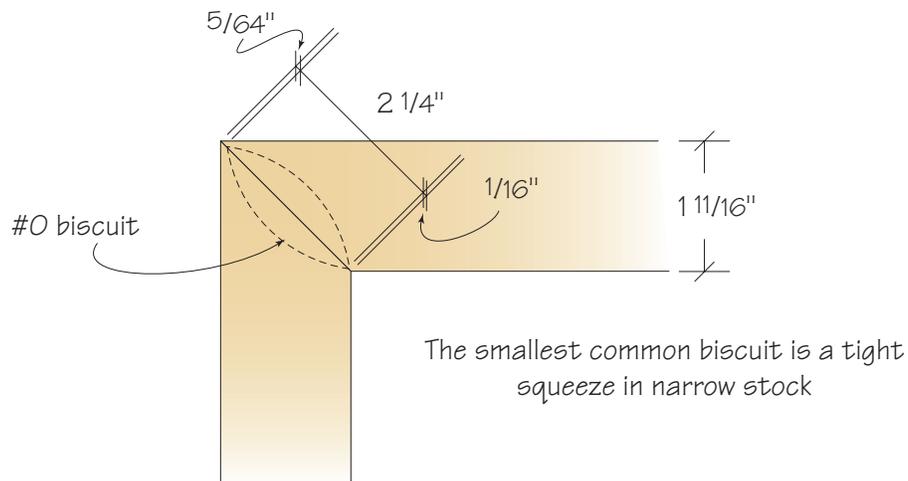
Miters



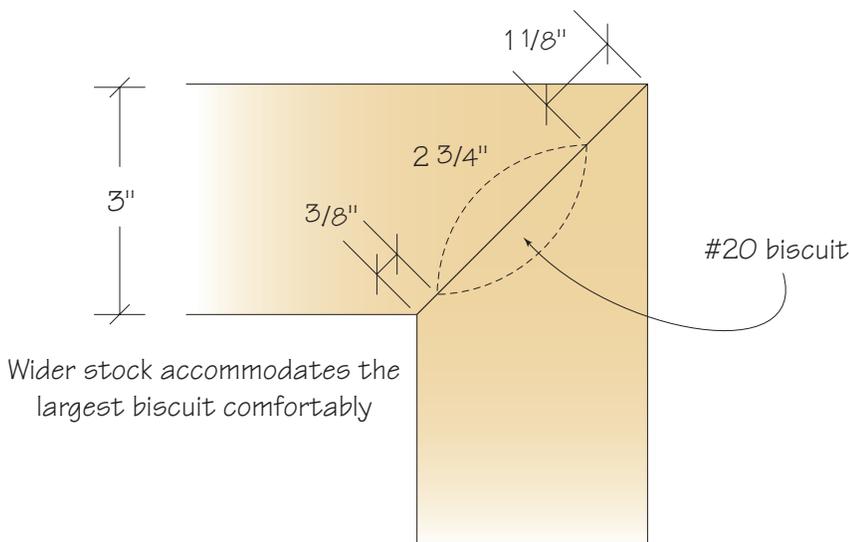
Biscuits do an excellent job of aligning and locking case miters during assembly. If you are biscuiting case miters in standard 3/4" sheet material, you must be wary of the slot penetrating the surface veneer. This is likely to happen if the cut is centered on the bevel. Locate the slot near the inside corner.



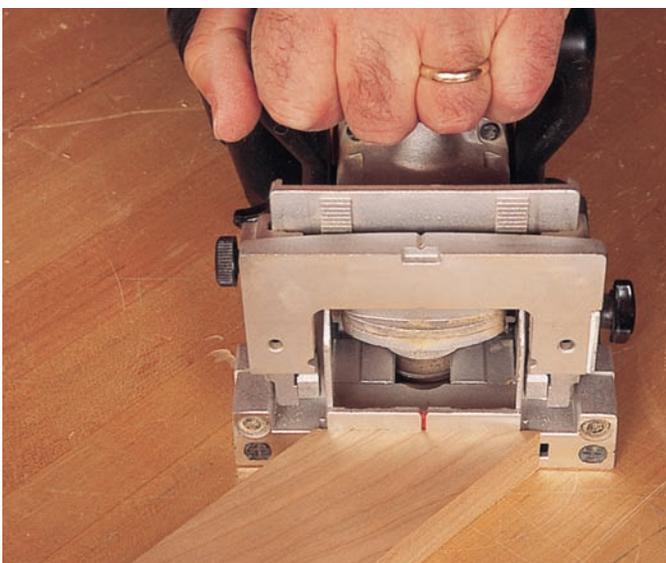
Clamp the inside faces of beveled case parts together so you can use the base as the reference for slotting the bevels. With the parts lined up carefully, the bevels form a 90° cradle to support the base. If you use a 1/4"-thick spacer between the parts, you'll get the best placement of the slots. Alternatively, you can use the joiner fence to guide the cuts on individual case parts.



A biscuit is a practical way to spline a frame miter. Even when the mitered edge barely exceeds the length of the biscuit slot, you can be confident the slot won't break through the frame at the tip. But if you plan to mold an edge of the assembled frame, it's a good idea to shift the biscuit away from that edge so the profile cut doesn't expose the biscuit.

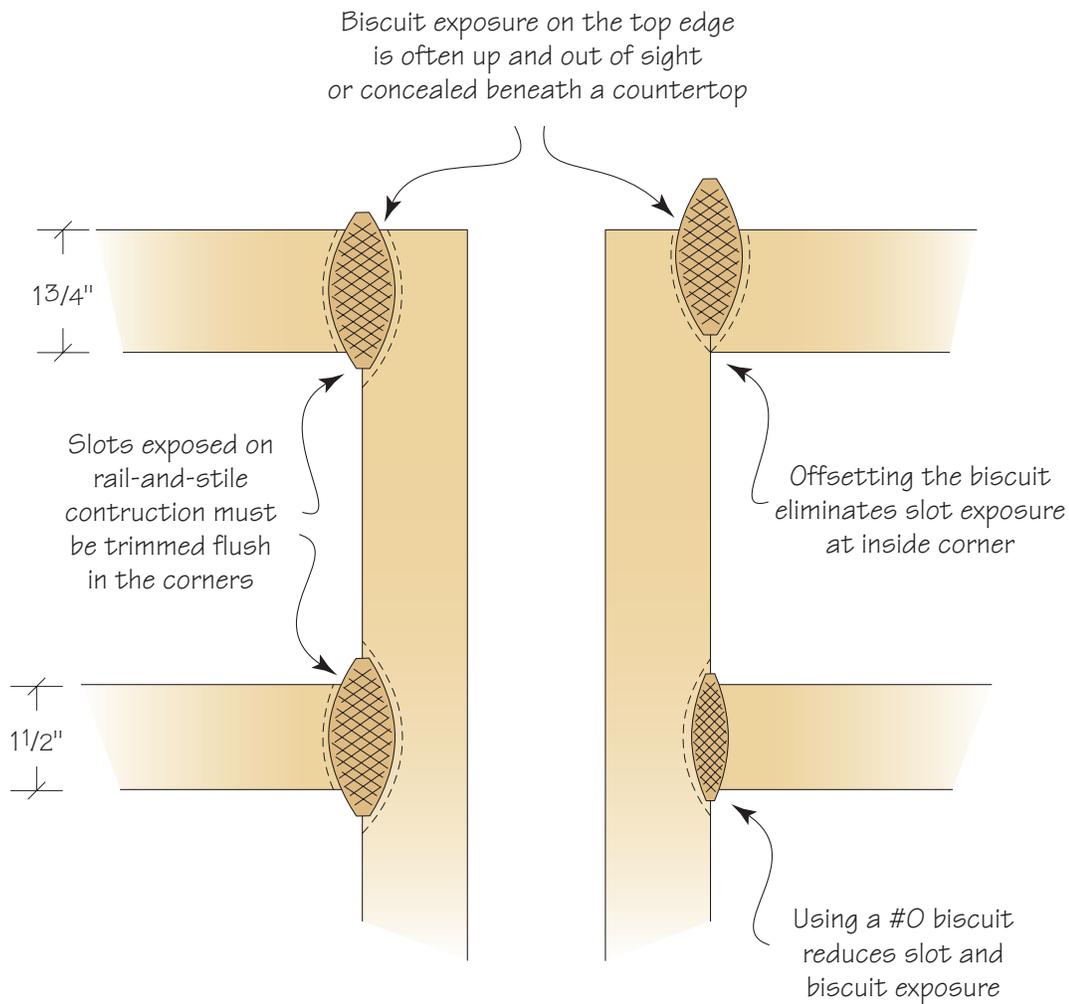


Biscuited frame miters



Securely clamp any frame part to prevent it from moving as you plunge the cutter. This cut is particularly dicey because the tool's antislippage pins are off the surface to be cut and can't provide any traction. It is especially easy, in this situation, for the tool to jump to the side as the cutting teeth contact the wood.

Face-Frame Joinery



Biscuits do a good job of joining the parts of a face frame, but there is a cosmetic issue. The slot for even the small, #0 biscuit is longer than 2". In many instances, face frame rails aren't that wide. Assemble the frame and the ends of the slots are visible. A common view is that the slot exposure is no big deal, since it'll only be visible when doors and drawers are open. The situation is different if the frame is for a bookcase, with the inner edges of the frame exposed. Because the frame is fixed to the case, strong joints in the frame itself aren't essential.

Biscuits in face frames



If you opt to biscuit a face frame, lay out the parts in a mock assembly to mark the slot locations. Lay a biscuit on the seam between rail and stile to determine what size biscuit to use and what, if any, offset is appropriate.



If the top and bottom edges of the face frame won't be visible, you can offset the slot. There's no exposure at the inside corners, but as much as half the biscuit will protrude at the outside edge. After the glue sets, trim it flush.

FACE FRAME TO CASE ALIGNMENT



Like an edge-to-edge joint between well-jointed boards with the proper glue application, a glued edge-to-face joint — such as that joins a face frame to a case — is strong and without need of reinforcement. But a few biscuits placed in key spots guarantees your face frame will be aligned just the way you want it. They prevent the frame from squirming out of position as you apply clamps.

Set the assembled frame on the assembled case and mark slot locations. You don't need a lot of biscuits, and you don't necessarily need them in all edges. Two or three biscuits in each side and one at the center of the top is sufficient for alignment in all but the biggest units.



Stand the face frame on edge to slot it for mounting to the case. If I wanted a $\frac{1}{4}$ " overhang along this edge, I would place a scrap of $\frac{1}{4}$ " MDF under the joiner base.



Use the joiner's base as the reference when cutting slots in a case and face frame. Here, the case is on its side. I'll upend it to cut the slot in the top, so the reference surface is consistent.



With the slots cut and the biscuits in place, you can drop the frame onto the case and know it is aligned just the way you want it.



Assembly

In assembling a biscuit joint, it's essential to get enough glue in the mating slots and on the biscuit to promote expansion of the little wafer. But be discrete; you don't want it welling out of the slots, dripping and gushing across the nice wood. Experience makes it easier.

You can buy applicators designed for biscuit slots. I usually run the glue-bottle tip along the edge of the slot, then use an artist's brush to spread it through the slot. I run a bead from slot to slot, and I use the brush to spread it too. When the glue is applied to both

mating parts, I stuff a biscuit in each slot and close the joint. Seat it firmly, and move on to the next.

Be wary of seating biscuits one at a time, and of trying to apply glue to all the joints in an assembly before closing any of them. The biscuits can swell and make assembly difficult.

A benefit of biscuit joinery is that your case will clamp up square. (This assumes, of course, that all your parts are squarely cut.) The scramble to wrench the case into proper alignment before the glue sets up is reduced to a low-key measuring of diagonals to confirm what you already know.

In a large, multijoint construction, apply glue and assemble the joints one by one. Biscuits start swelling as soon as they are dampened with glue. I sweep glue through each slot in a row with a small brush, then insert the biscuits and set the mating part in place.