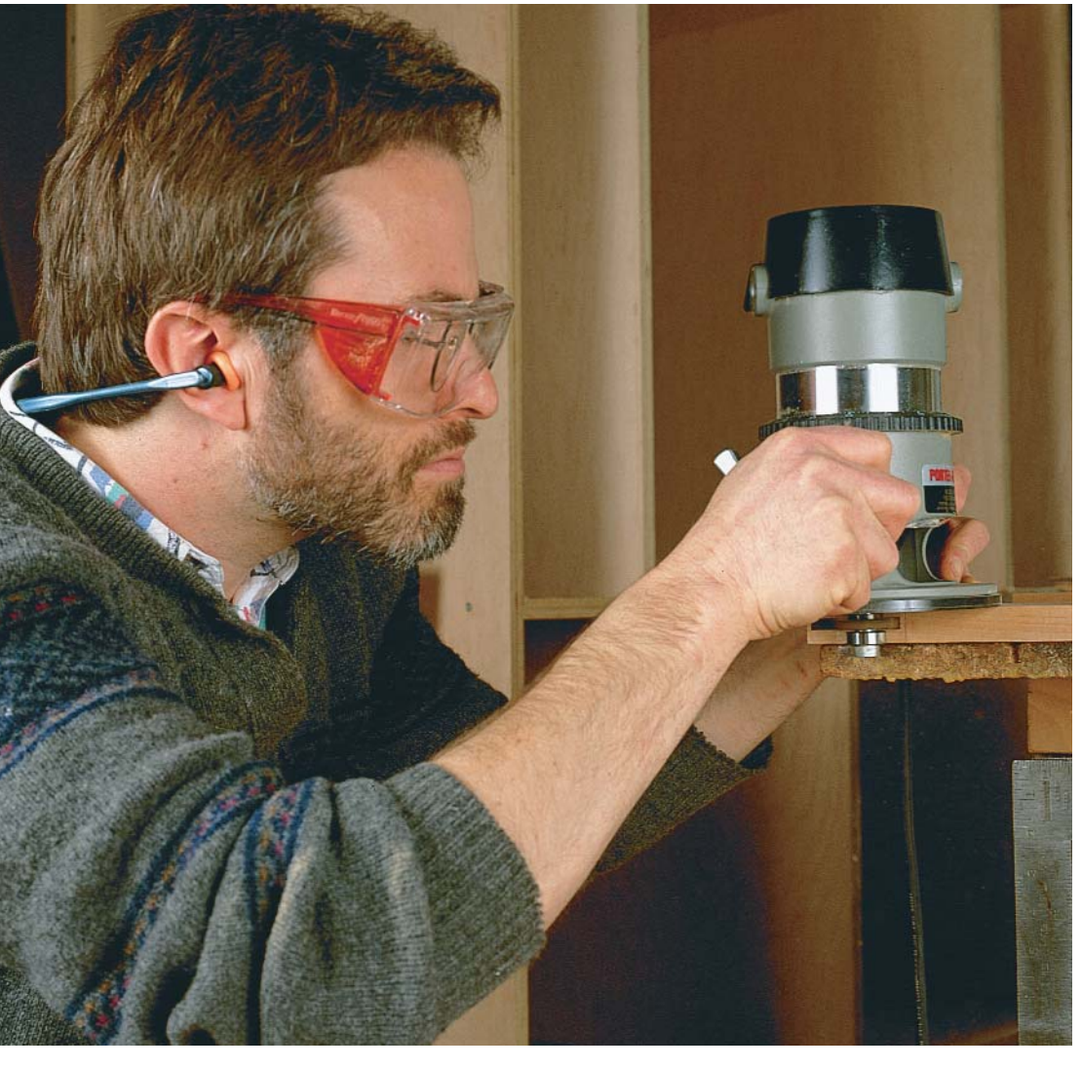
Spline Joinery

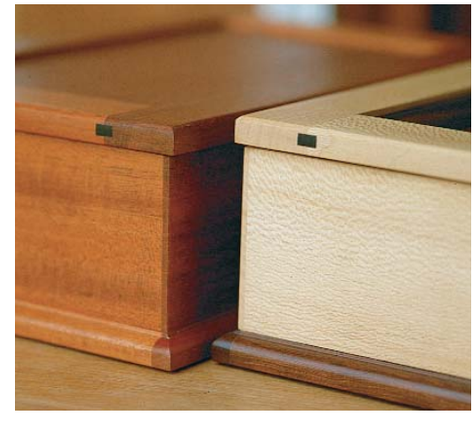
Stronger, quicker and more versatile than biscuits

by Steven Cook



***A router and slot cutter substitute for a plate joiner** (left). A steady hand and a keen eye (protected by safety glasses) will yield a strong, quick spline joint.*

***Splines can be used as a decorative element** in addition to their structural role, as is the case with the ebony splines in the lids of the author's boxes below.*



In 20 years as a professional woodworker, churning out cabinets, making custom furniture and even some musical instruments, I've always looked for ways to make my two-man shop productive and profitable. One technique I use in virtually all my work is the spline joint.

The spline joint is simply the joining of two boards with a piece of scrap plywood or hardwood that's set into grooves routed in the two boards. Whether you need to align boards to be joined for a large tabletop, make face frames for a set of cabinets or join rail and stile for a frame-and-panel or glazed door, spline joints are useful.

The spline joint is easier than doweling and stronger, too. Locating the splines is easy because the critical dimension is controlled by the depth setting of the router (see the photo at left). Just be sure to index from the same face, and whatever you're joining with splines will be in the same plane. Since I already have several routers, it's a lot cheaper to use a slotting cutter and splines than to buy a dedicated plate joiner, which makes a similar, though less adaptable, joint. Also, I use mostly scrap plywood for my splines, so there's less chance of swelling or having the spline telegraph through to the surface than with conventional compressed birch biscuits.

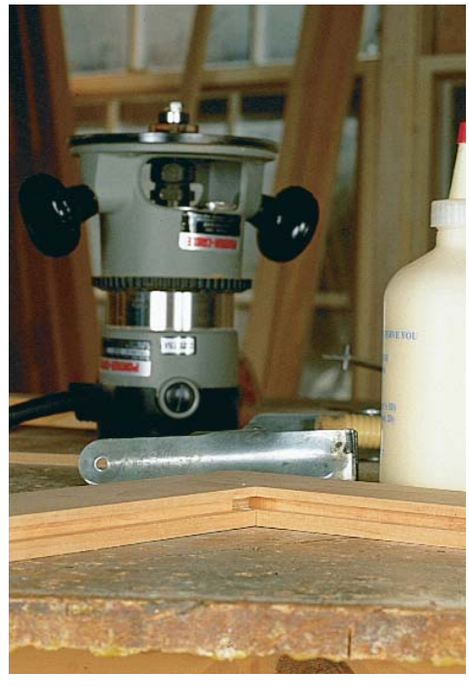
The right equipment: a good slotting cutter

Other than a router, the only item you need for spline joinery is a slotting cutter, a generally available router bit. These come in many diameters and slot widths, but choosing the right one needn't be confus-

Photos: Vincent Laurence

You can shape splines in seconds *on a variety of common shop machines, including a stationary belt sander (right).*

Slots for frame joinery *and panel can be routed simultaneously with a pair of 3/32-in. cutters separated by a thin washer (right). The result is a strong frame and a snugly fitting panel.*



Use solid end pieces with plywood splines *to get maximum strength without sacrificing looks or speed (far right).*

ing. There are two general rules. First, select the largest shank size your router will accommodate—usually ½ in. And second, go with the smallest diameter cutter you can find because a ¼-in. shank and a 1¾-in. cutter make a weak and dangerous combination. I have a couple of bent shanks in my collection, as well as ruined router bases, due to the mass of the cutter being too great for the shank.

My favorite bit has a ½-in. shank, 15/16-in. cutter and a ¾-in. pilot bearing. That means there's just over ¼ in. of cutter in the wood, and the ½-in. shank can handle that easily. Also, the depth of cut, which is actually 9/32 in., means that your spline is more than ½ in. wide (9/32 and 9/32 are 9/16), making for a strong joint.

Cutter widths vary from 1/32 in. up to ½ in. or so. Most of my structural joints are made with a ¼-in. cutter. When joining a frame that is also taking a ¼-in. plywood panel, it's necessary to use two 3/32-in. cutters with a thin washer between them to make a slot that hugs the undersized plywood.

Making splines

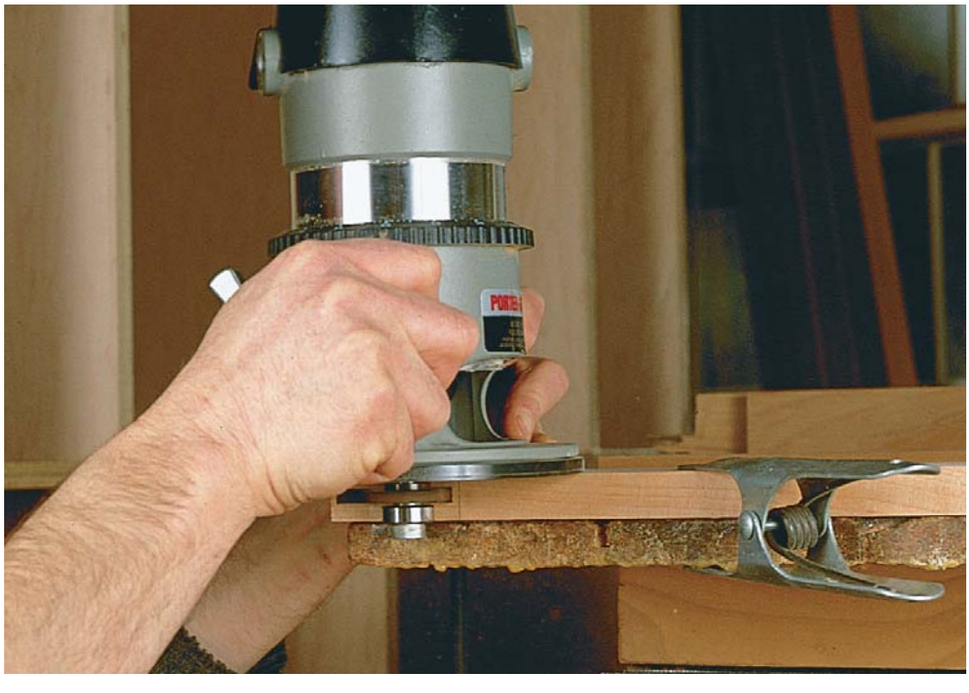
Splines can be made from a variety of materials, including medium-density fiberboard (MDF), plywood and solid wood. My favorite is planed-to-order Baltic birch. I use it all the time for drawers, so there's plenty of scrap. When joining solid boards edge to edge, as for tabletops, I rip thin sections of spline material. When I'm using biscuit-shaped splines to join rail and stile to make frames, I bandsaw the splines to rough size and shape them on either my stationary belt sander or a sanding drum on my drill press (see the top photo).

If you use solid wood for splines, make sure the grain runs across the joint, rather than parallel to it, for maximum strength and to allow for seasonal wood movement. Frequently, I'll use plywood splines for all but the ends of a long joint, particularly large panel glue-ups, and just use small bits of solid wood at the ends where they'll show. This makes for a strong joint that looks nice and works well for tabletops and box lids (see the bottom right photo and the photo at right on p. 97).

Frame joinery, panel alignment and decorative edging

I've used slotting cutters for many purposes other than what they were intended for, including rabbeting all around the top edge of a tabletop to inlay a strip of contrasting wood. The most common uses of the slotting cutter in my shop, however, are to join frames and to align and strengthen panels I'm gluing edge to edge.

When I'm joining a frame that takes a flat plywood panel, I make the panel and spline the same thickness and rout both



SPLINES FOR A GLAZED DOOR

A slot cutter makes a blind spline recess *in the end of the rail (left). The author makes the cut freehand, using a pencil line to set the limit of the spline groove.*

Mating slots are cut in the stiles. *With the router and slot cutter at the same setting, the author makes the stile slot (left). The depth setting of the router keeps everything in line as long as all cuts are from the same side of the frame.*

Plywood makes a biscuit-style spline. *A piece of plywood sanded to shape fits snugly in the finished slot (below). The author will reset the depth of cut for a rabbet to create the recess for the glass.*

the panel groove and the recess for the spline simultaneously. To do this, I stop just shy of the ends of the stiles and rout right around the ends of the rails, stopping shy of the outside edge (see the bottom left photo on the facing page).

For glazed cabinet doors, I want to be able to remove it if it ever breaks, so I use the router and slotting cutter just as I would a plate joiner: I make blind slots in the ends of the rails and the top inside edges of the stiles (see the photos on this page). Then I come back later, adjust the router's depth of cut for a rabbet rather than a groove and create a recess for the glass. The corners will be round, but most glass shops will be glad to radius the corners of a sheet of glass for you. □

Steven Cook is a professional woodworker and musical-instrument restorer in Edmonds, Wash.