

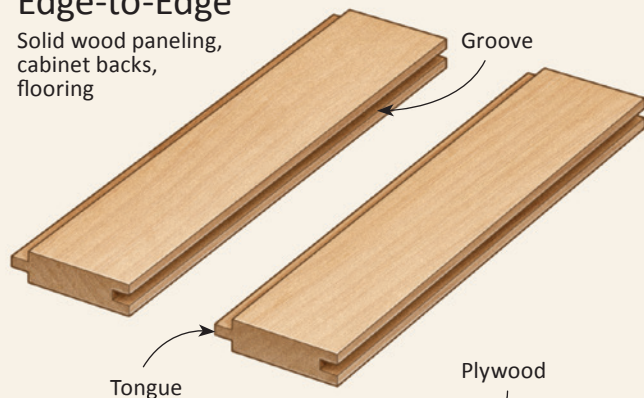
Tongue-and-Groove

Making Perfect Tongue-and-Groove Joinery on the Router Table

By Andy Rae

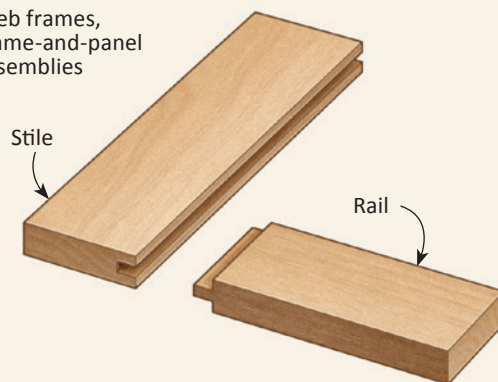
Edge-to-Edge

Solid wood paneling, cabinet backs, flooring



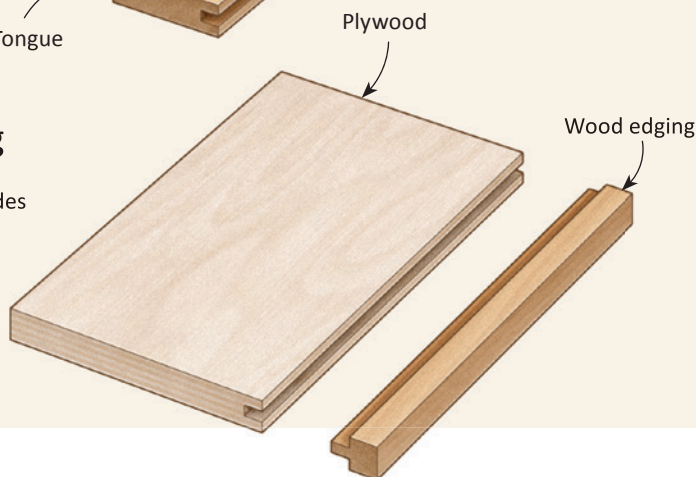
End-to-Edge

Web frames, frame-and-panel assemblies



Edging

Shelving, cabinet sides



Common applications:

- Edging
- Web frames
- Cabinet backs
- Wall paneling
- Flooring

With its relatively short tongue that fits into a shallow groove, the tongue-and-groove joint is woodworking's diminutive cousin to the mortise-and-tenon. Thankfully, it's much easier to make, in large part due to modern routers and router bits. The shorter tongue is a good choice for registering parts, such as when fitting wood panels or boards for cabinet backs and flooring (in which case the joint is typically assembled without glue.)

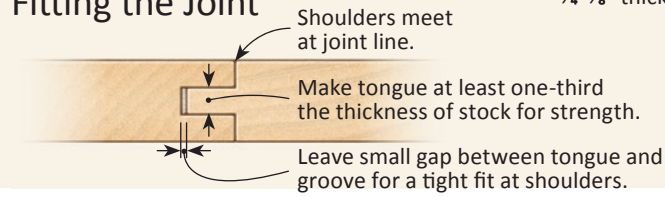
When it comes to cutting the joint, the router table makes quick and precise work of the job, thanks to router bits that cut complementary tongues and grooves. Think of it as cut 'n go: Rout each edge, and you've made a perfect joint. There's a range of bit designs on the market, from single, reconfigurable bits that you take apart and rearrange to cut both sides of the joint, to 2-bit, matched sets and "convertible"

bits that allow spacing the cutters to suit your stock's thickness. All these bits cut the profile in a single pass—a much more desirable approach than using a straight bit, rabbeting bit, or slot cutter to shape the joint, where inconsistent stock thickness can screw you up. With a tongue-and-groove bit or bits in your router table, a few accessories, and some simple techniques, you'll get reliable cuts every time.

Basic T&G Design

For strength and aesthetics, the tongue should slip snugly into its groove (whether the joint is to be glued or not). Making the tongue about one-third the thickness of the stock ensures that all parts of the profile are as stout as possible.

Fitting the Joint



Groove dimensions:
 $\frac{1}{4}$ - $\frac{3}{8}$ " wide \times $\frac{1}{4}$ - $\frac{1}{2}$ " deep

Tongue dimensions:
 $\frac{1}{4}$ - $\frac{3}{8}$ " thick \times $\frac{1}{4}$ - $\frac{1}{2}$ " wide

Mill stock with straight and parallel edges.

Router Table Setup

When routing tongue-and-groove joints, consistency is key for a good fit and part alignment. For predictable results, use the right tools, accessories, and setup. First, it's important to use a powerful router with variable-speed control to ensure smooth, safe cuts when using these big, heavy bits. Make sure your router table is equipped with a straight, flat, split-fence with an adjustable center opening. Alternatively, you can saw out an opening for the bit in a thick auxiliary fence, and clamp that to your existing fence. A featherboard clamped to the fence ensures consistent grooves and tongues, and pushsticks and pushblocks keep your hands safe. Tongue-and-groove bits create a lot of chips, so dust collection is crucial.

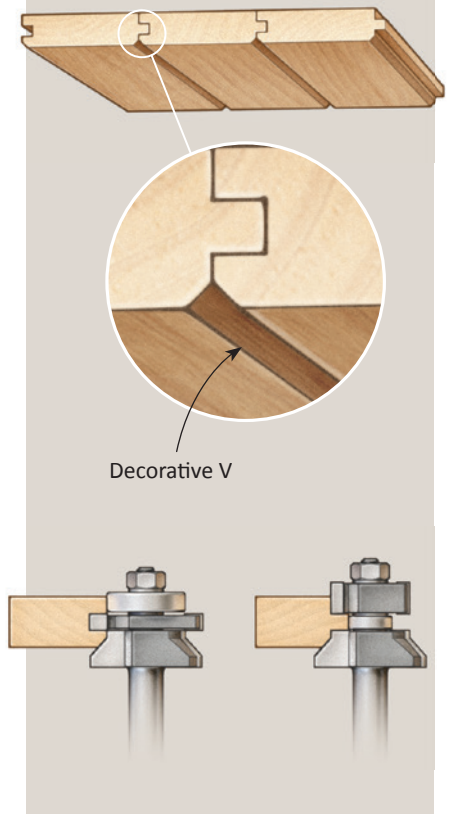


Dial it down. Use a variable-speed router, and keep your speed around 15,000 RPM to lower vibration and reduce stress on the router and bit.

A Dressy Option

Some router bit manufacturers offer matching bit sets that incorporate a bevel in the profile. The resulting V-grooves in the assembled panel add an aesthetic element while hiding any slight misalignment of the parts.

V-groove paneling



The right stuff. For tight, crisp joints, equip your table with a 1½ hp (or more) variable-speed router, a split fence, a featherboard, a hefty pushblock, a plywood pushstick, and through-the-fence dust collection.

Making the joint with a 2-bit set

Using a mating 2-piece set of router bits is one of the most accurate and efficient ways to make the joint. Mill the groove first. Start by aligning the groove bit's ball bearing tangent to the front face of the fences, and then center the cutter across the thickness of test stock milled to the desired dimensions. Use a featherboard and a pushstick to make the cut, routing the groove in a single pass. Rout the tongue next, using the routed groove to help set the tongue to the correct height and again aligning the bit's bearing tangent to the fence. Make a test cut to check that the joint fits and the board surfaces align, and then rout as before, feeding smoothly with consistent pressure.



Mating bits for efficiency and accuracy. This 2-piece set from Freud accommodates stock thicknesses from 1/2" to 1 1/4". One of the bits cuts the tongue, and the other the groove. You can fine-tune the cut on both bits by adding or subtracting spacers.

Rout the groove first...



Keep the groove smooth.

A fence-mounted featherboard ensures a groove that's parallel to the board faces. Using a pushstick keeps hands clear of the cutters while offering more control for a smoother cut. For consistency, make all cuts with the "show" face against the table.

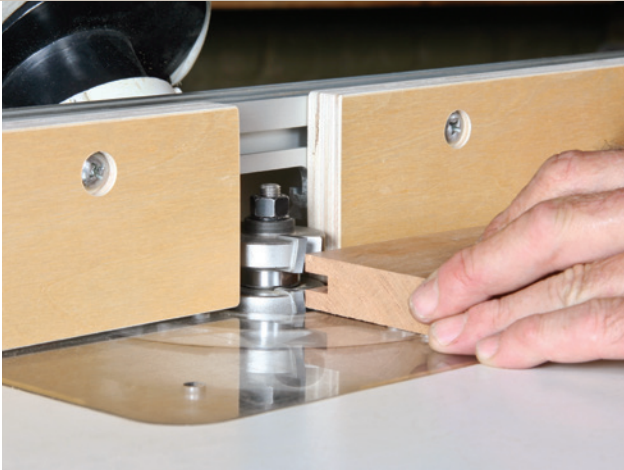
Routing Ends

Cutting tongues on the ends of work is handy for rail connections, such as when making web frames for drawers and other case components. Narrow rails can be tippy against the fence, so you'll want to back up the cut with a pushblock for safe, square cuts. Bonus: The block prevents tearout at the same time.



Back it with a block. Use a squared pushblock to keep the workpiece steady against the bit's bearing and the fences while you rout, and to prevent tearout at the back.

...then tackle the tongue



Eyeball the height. Set the tongue bit's height by lining up its cutting edges with the groove, and then make a test cut in scrap to verify your setting.



Rout the tongue in one pass. Keep the pressure steady by bumping out the featherboard with screws and plywood spacers to clear the taller cutter. Use a pushstick as before for a smooth tongue with a consistent thickness and width.

T&G for Less

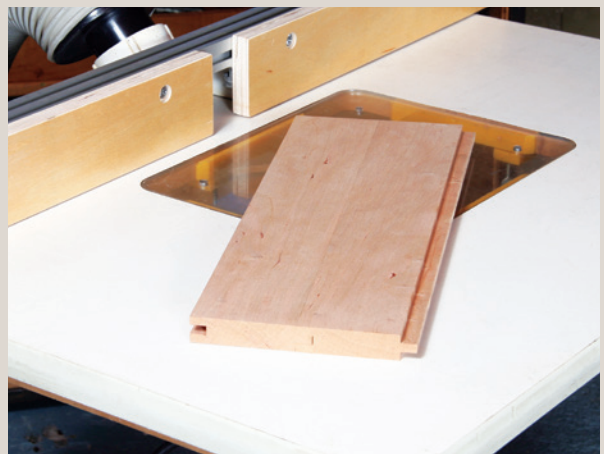
For around \$50, you can buy a single WoodRiver bit that will cut tongues and grooves in $\frac{3}{4}$ "-thick material. Use both cutters to make the tongue; then use a single cutter for the groove. See Buyer's Guide, p. 64 for ordering information.



A Good Lookin' Fit

A well-made tongue-and-groove joint presents a gapless seam along the shoulders, or face, with a tongue that fits snugly into the groove. To ensure tight shoulders, look for a hairline gap between the end of the tongue and the bottom of the groove. Some manufacturers build this into their bit design. If your tongue bottoms out, make a pass with the tongue's edge on the jointer or with a couple swipes from a hand plane.

Groovy joint. You can make wide panels, such as for cabinet backs, by joining a series of tongue-and-groove boards together. A good joint shows tight shoulders with a small gap visible inside the joint.



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