Develop Your **Shop Skills**

Keys to Building Forever-flat Tabletops

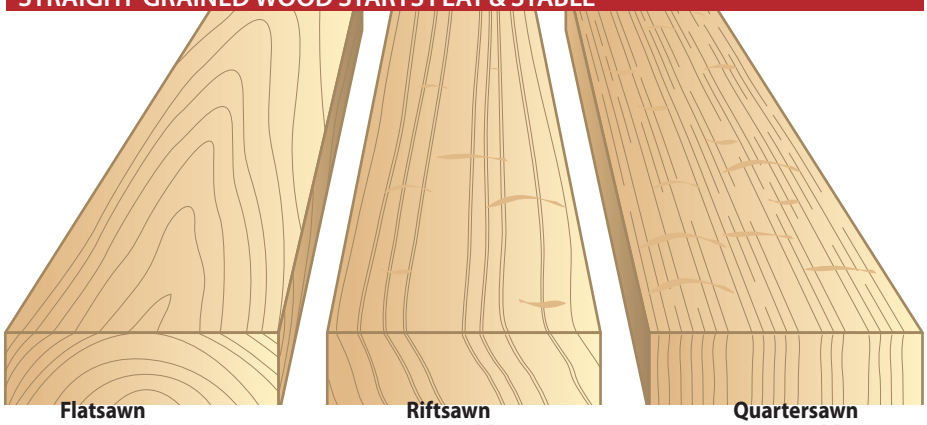
To make a flat solid-wood tabletop that *stays* flat throughout its life, you need to choose, prepare, machine, and join its boards correctly. Sound tricky? Not at all—just follow these tips.

Choose the right stock

When selecting lumber for your tabletop, avoid heavily knotted or highly figured boards. You'll get more stability from clear stock. Also examine the end grain to learn how the lumber was sawn from its log. Riftsawn and quartersawn boards (see illustration *below*) warp less than flatsawn lumber. The reason: A board tends to flatten along its growth rings (visible from the board's end) as it dries. On flatsawn stock, the growth rings appear in a hill-like shape, and as the hill flattens, the edges of the board pull up, causing a cup.

Instead, select lumber with straight grain on its face: Those boards cup less, typically, and also blend together more easily when assembled into a completed top. To further improve stability, select thick boards with closely spaced growth rings that signify slow-growth woods; the tighter rings will limit warp, and thick boards add mass to your tabletop that helps it resist movement. So keep those boards as thick as possible during machining, particularly for large tabletops where the effects of warp will be magnified.

STRAIGHT-GRAINED WOOD STARTS FLAT & STABLE



Flatsawn (Least stable) | Riftsawn (More stable) | Quartersawn (Most stable)

WOODS THAT RESIST WARP

To win the fight against wood warp, start with a wood species that moves less with changes in humidity. Common domestic species, such as oak, maple, cherry, and walnut, tend to stay flat; beech, sycamore, elm, and hickory have a tendency to warp.

STABLE

WARP-PRONE

Orient the boards for strength *and* beauty

Although you may not be able to completely prevent wood warp, especially using common and economical flatsawn lumber, you can limit its effect by the way you arrange the end-grain growth rings. You have three choices:

1. Orient all boards with the growth rings positioned like hilltops *(below, top)*.
Result: The tabletop will curl upwards at its outside edges.

2. Orient all boards with the growth rings configured like a series of valleys.
Result: The opposite of orientation #1: The tabletop will crown in the middle.

3. Alternate the direction of the boards' growth rings *(below, bottom)*.
Result: A wavy tabletop—each board cups in an alternating direction.

So how do you choose the best orientation? For tabletops fastened to an apron (a wood-rail framework that surrounds and supports the table's legs), we suggest orientation #1 because the apron secures the tabletop at its edges, restricting that movement. For tabletops that mount in the center, such as pedestal or trestle tables, orientation #2 will move the least. The fasteners installed in the table's center would restrict or eliminate warp.

With your boards oriented for stability, don't forget about the overall look of your final glue-up. Working within the confines of your stable board orientation, shuffle and rotate the boards for a pleasing appearance where the grain from one board seems to flow into the one beside it.

***Quick Tip!** With the tabletop laid out in its final configuration, number the boards. Should they need to be moved or separated, you can put them back in order easily.*

MATCHING GROWTH RINGS MAKE THE TOP CUP PREDICTABLY

ALTERNATING GROWTH RINGS MAKE WAVES

Although each board comprising a tabletop may warp only a little, the effect of that warp magnifies across the tabletop's width, as shown. You may not be able to prevent the boards from warping, but you can predict how they'll warp according to the way in which you laid out your boards, and fasten the tabletop accordingly.

A flat glue-up makes for a flat tabletop

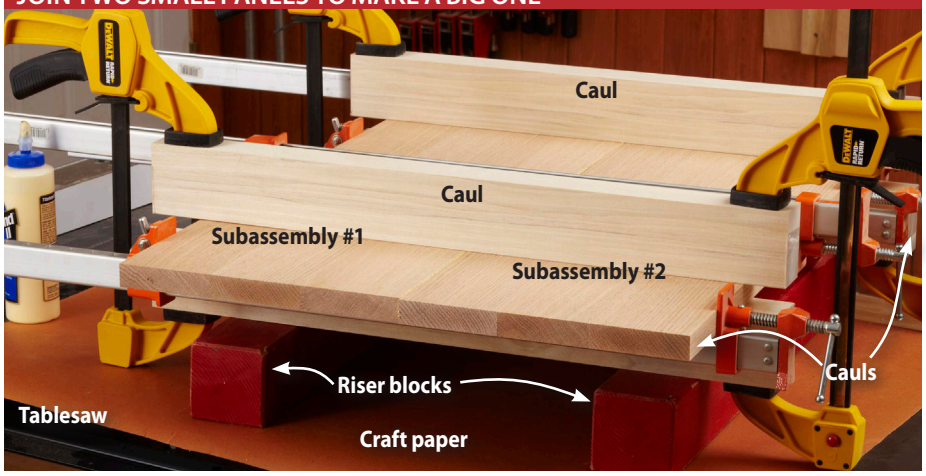
With the boards laid out for stability and appearance, group the boards into subassemblies (keeping the numbered boards in order) to fit the width of your thickness planer.

***Quick Tip!** Before gluing up your panels, consider cutting tongue-and-groove joints along the board edges to aid alignment and add strength.*

Find a flat surface (such as a tablesaw top) and glue up the subassemblies. When dry, plane them to the same thickness; then, join them together in a final glue-up. Note: Clamp pressure and glue lubricity can cause the subassemblies to shift, especially in larger glue-ups. Use clamping cauls and riser blocks to create a flat panel, like the one at *right*.

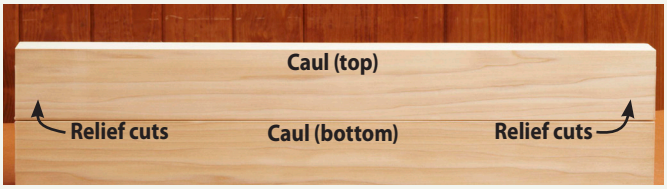
After cutting your tabletop to its final dimensions, commence sanding. Don't linger too long on imperfections or problem areas—you're likely to oversand and create divots that will be magnified after you apply a finish. Be sure to give the tabletop's edges as much attention as its center.

JOIN TWO SMALL PANELS TO MAKE A BIG ONE



To achieve a flawless tabletop, your glue-up technique must be flawless, too. Employ riser blocks to provide clearance for the clamps needed to pin the clamping cauls tight to the panel.

Heed the caul



Tapered slightly from center to edge, clamping cauls (like those at *right*) put more pressure on the panel's center, where clamping pressure is weakest. Along each caul's edge, take a few shavings with a hand plane from both ends to create a subtle spring. We wrapped the edge of the caul with packaging tape to prevent squeezed-out glue from bonding with the caul.