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Woodworking Tools Home > Flatten a Workbench with a Router

Making It Plane:

How to Flatten a Workbench with a Router

Committed hand tool enthusiasts can flatten a workbench by hand with a [jointer plane](#), but after doing two of three large benchtops that way myself, I developed a distinct urge to find a less laborious method. It was Tage Frid (it's pronounced "Tay") who showed me a router jig that could be scaled up to mill even the largest benchtop rapidly and accurately. A couple of versions of the idea appear in *Tage Frid Teaches Woodworking, Book 3: Furnituremaking* (pages 158 & 164). The design is typical of Tage's approach to woodworking: the concept is simple and the work itself quite straightforward. All you have to do is arrange for a [router](#) to move in a flat plane just above your workbench; set your depth of cut to skim the entire surface, and at the end of the exercise the benchtop will be flat. Nothing to it.

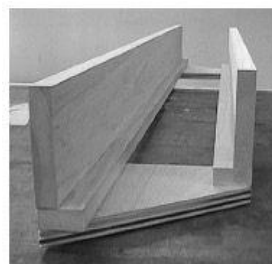


The flattening jig is readily fabricated from solid wood or plywood. You'll make two side rails roughly 18" longer than your workbench, and you'll make a sled that can ride lengthwise along the rails while your router slides back and forth within. Make the rails of 3/4" lumber 6" to 8" wide. Joint one edge of each piece as carefully as you can, then butt the edges against each other for a critical look at how close you've gotten them to straight. I finished mine with

my 07 jointer plane to get them even straighter than my 5-ft. jointer could do. When you're satisfied, rip the opposite edge of each piece parallel. Make the side walls and bottom rails of the sled in the same way, taking care to get each component as straight as reasonably possible. Don't waste your time worrying about thousandths of an inch, but just do good work.

The router sled

Make the sled with high side walls to resist sagging under load, and attach strips along the bottom edges to support your router and stiffen the walls as well. Make a square sub-base for your router so it will sit stably and securely in the sled. Attach cleats beneath the ends of the side walls to separate them by the width of your sub-base; they should hold the sled snugly across the rails on your bench. Nail stop blocks into each end of the sled to limit the router's travel, so the bit you use just barely cuts into the side rails. Unlike those pictured, make the cleats that join the sled walls several inches wider than the sled (I ran short of scrap plywood) so they'll slide along the rails without racking and binding. Wax the top of the rails, the inside of the sled and the face of each cleat to make all moving parts smooth and slippery.



Checking for twist



Before you start work, get a clear picture of what needs to be done. The side rails make good straightedges for checking the benchtop's length and width, and together they can be used as oversize winding sticks to check for twist. Note the edge of the far rail has been blackened with a magic marker for good contrast, so even the slightest twist will show clearly. If there is twist present, note the high and low corners, and plan to set up your side rails accordingly: a little higher above the low corners of the bench, and a little lower

at the high corners. This lets you remove as little material as possible while getting the top completely flat.

Leveling the rails

Mount the side rails on the edges of the bench with screws at each corner (plus one in the center on a long bench). Drill 3/8" holes through the rails to allow for height adjustment, and drive #10 or #12 screws with washers into the bench. Getting the top edges of the rails into the same plane is







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unbelievably easy. Drive a nail into the outside face of each end of each rail. Tie a piece of strong string to one nail and pull it tight diagonally across the bench, tying it off to the nail in the far corner. Do the same on the other diagonal. Since the second string crosses above the first, it must be shimmed up exactly one string diameter where it rests on the rails.

Adjust the rails until the two strings just kiss where they cross in the center of the bench. If you can't touch the upper string without moving the lower one, but the lower one doesn't rise at all when you lift the upper, then you have established nearly perfect contact — and the edges of your two rails now lie in a perfectly flat plane. When one of my students taught me that trick I couldn't understand why it worked; it's just too idiotically simple and far too cheap. It works, though, with an utterly fabulous degree of precision. If like me, you're conceptually challenged, just do it without waiting on understanding — results will explain it all more clearly than words.



Getting it done

Put the biggest straight bit you own in your router (mine's 1-3/4" diameter) and set its depth to just touch the benchtop at its lowest corner (which you determined with the winding sticks way back when). Start at the far corner of the right end of the bench. Pull the router all the way across, and push it back along the same path; then move the sled to the left slightly less than the bit diameter and repeat the process. Routers go left [the subject of another free handout, *Routers Go Left!*, so make sure there's no uncut surface to the router's left (not your left) as it travels — thus if your control isn't perfect as you pull the router along, the worst thing that can happen is that the bit will push itself out of contact with the wood and the router will simply stop moving. Sure beats having it try to rip itself out of your hands and run off across the bench.



Incidentally, this technique also directs almost all the waste straight away from you, so you can rig up a dust port at the far end of the sled and capture most of the enormous amount of debris you're going to generate. We'll not let it go without saying that you *are* going to wear eye and hearing protection along with a good dust mask, right?

Finishing

A No. 80 handled scraper makes very quick work of smoothing bit marks on the flattened surface to prepare it for finishing. Sand the edges lightly, wipe off all the dust, and apply several coats of Waterlox or your favorite oil. Now re-mount you vise or vises, trim their jaws flush with the new surface, and get back to work!

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