

Four-squaring with hand tools

In my woodworking classes, before I let students use machines, they are required to rip, crosscut, surface and edge-joint boards—a process called four-squaring—by hand. Hand-tool methods bring students closer to the process. They can understand wood easier—grain characteristics and vagaries—when they work it by hand. Hand tools make wood more of a sensitive material you pay attention to, not some impersonal matrix you ram through a machine. Plus, hand-tool work will stand you in good stead some day if one of your machines is down and you can't get parts for a week.

Most problems students have with hand tools stem from using lousy, dull tools. You can't do serious work with grandpa's old, rusty plane, and even lots of new tools aren't very good. I use a five-point German bowsaw for dimensioning. It cuts fast and accurately. I use Lie-Nielsen planes. Sharpen them, and they cut beautifully right off the shelf. No other metal planes do. These planes have solid castings, thick blades made of good steel and are manufactured to close tolerances. Nothing is more infuriating than

cut bread. But if you make an effort to angle your wrist outward and away from you, cutting squarely will be much easier. It's just a matter of practice—like hitting a tin can with a BB gun.

If it seems daunting to cut accurately in two planes at once—the face and the edge—you may be using the wrong saw. A bowsaw has a thin, 1 $\frac{3}{8}$ -in.-wide blade that is held in tension in the frame. It cuts very quickly, won't whip or kink in the kerf and is easy to control. You can cut to a line—an essential skill—easily with a bowsaw. Small wonder the bowsaw is a staple tool in Europe. I don't know why we haven't heard more about this tool in the United States.

Flatten with a scrub plane

The scrub plane is the most crucial plane in the mix, yet it is the most overlooked and misunderstood. A scrub plane flattens a board; that is, it takes out the twist, warp and bow. A jack plane can remove high spots left by the scrub plane, but you can't flatten a board with one. A jointer plane can square an edge and remove



Crosscut with a bowsaw. Keep your wrist angled outward, and with a little practice, you'll be able to make square cuts.



Scrub plane is for flattening. Using a scrub plane, with its radiused blade, work the board diagonally in one direction and then the other.



Check a board's flatness. Place your fingers on diagonal corners of the board. If the board rocks on the bench, move your fingers toward the center. When the board rocks no more, the high spot is between your hands.

trying to do sustained, serious work with a plane that has a wavy sole and a tinny blade that won't stay sharp or with a clumsy saw that has too-thick a blade and an uncomfortable handle.

Good tools will solve 90% of problems in hand-tool use. Keeping them razor sharp will solve another 5%. Most students think they are at fault as they try to chip and bang their way through a board. Then they try my tools and discover their cheap planes and saws were the culprits—not them. The last 5% of hand-tool problems can be alleviated with practice. Think of how awkward you felt the first time you drove a car.

The beauty of the bowsaw

Start the four-squaring process by using a sharp pencil or a razor knife to mark a line across a board, then crosscut the board to a rough length. (You'll cut the board to final length as the last step.) Lop off the first 4 in. or so of the board to remove end-grain cracks.

When you first start using a handsaw, the tendency is to angle the blade in toward you. The same thing can happen when you hand-

the last high spots from the face, but it can't flatten a board, either. A board can be flattened only with a scrub plane.

Lots of woodworking students think they can use a jack plane to do the work of a scrub plane. Forget it. It won't work. To flatten wood you need to remove unwanted areas in big pieces. If you try it with a jack plane, you'll end up with a smoothly surfaced, unflat board. It's like giving coffee to an inebriated person—you'll get a wide-awake drunk. The intentions are good, but the result is bad.

Scrub planes are designed to do one thing: flatten wood. The scrub-plane blade is radiused—it scoops like a gouge. It doesn't shave like a regular plane. Most problems arise from trying to take too big a cut with it. I regrind my Lie-Nielsen scrub-plane blade to a 2 $\frac{1}{4}$ -in. radius, then sharpen and polish it with waterstones.

Clamp the board on the bench. With about $\frac{1}{16}$ in. to $\frac{1}{8}$ in. of the blade showing, plane the board diagonally all the way in one direction, then the other. If the board has any pronounced bulges or high ends, plane those spots more. Flip over the board, and with your fingers on opposite corners, try to rock the board on the

Rules of Thumb (continued)

bench. Try one pair of corners, then the other. If the board rocks, there is a high spot. It's easy to find by bringing your fingers in from the corners toward the middle of the board while continuing to rock it. When the board stops rocking, the high spot is between your hands. Flip the board over again and remove the high spot with a scrub plane.

Plane the high spots

Next, jack-plane the high spots—the crest of the waves left by the scrub plane. I use a No. 5 jack plane, about 14 in. long and set for a heavy cut—it will take off a big piece. If the cut is too light, this step will seem to take forever. My jack plane has an adjustable throat, so I open that up a little, too. Work the plane on the board the same way: diagonally, first in one direction, then the other.



Jointer plane is the last one to use. With a long jointer plane, work the board with the grain, removing the marks left by the jack plane.

Use more pressure on the front handle to start the cut, equal pressure front and back in the middle, and more pressure on the rear tote as you finish. This technique will keep you from rounding down the edges. If that happens, the board will rock again when you flip it over, and you'll have to start over.

After taking off the high spots with the jack plane diagonally, plane with the grain using the jointer plane. If you use a good jointer plane, it will take up long, thin shavings easily (a lousy, dull one will skip and jump). Because grain always seems to change direction in the middle of a board, you may get some tearout. But tearout isn't all bad—you are doing handwork; the piece should look handmade, not manufactured. After using the jointer plane, flip over the board again and make sure it doesn't

rock. No need to be fanatical; you're working wood, not uranium. If it doesn't rock noticeably, it's good. That side is done.

Set a marking gauge for the final desired thickness. Bearing the fence on the face you've just done, mark a line all the way around the board. Clamp the board in the bench with the now-flat side down, and plane to the mark, working in sequence as before. Work the scrub plane to a little less than $\frac{1}{16}$ in. of the line. The jack and jointer planes will get you to it.

Joint one edge

With the faces of the board surfaced, plane one edge flat and square to the faces with the jointer plane. Clamp the board sideways in the bench. Take long passes with the jointer plane until the edge is straight and square.

Hold the jointer plane by the front handle and the rear tote, and guide it over the edge 90° to the face by eye. With a little practice, you'll also be able to see and feel a 90° cut here. Check it with a square from time to time, but don't use jigs, a fence or any other nonsense. And don't hold the plane so that you can guide it with

your fingers underneath. Hold the plane by the handles. Your eye-hand coordination is better than any gimmick or trick grip. Learn the correct way once, and you'll always know.

Rip the opposite side

With one edge straight, the next step is to make the opposite edge straight and parallel to it. Use a combination square and pencil to draw a continuous line for a rip cut with the bowsaw. Clamp the board in the bench horizontally, with the edge to be cut hanging off the side. Turn the bowsaw blade askew to the frame, and saw down the line. Keep the blade cutting just outside the line—about $\frac{1}{2}$ in., then plane it to the line afterward. The large teeth and long blade of the bowsaw make this fast work. When the board has been ripped to width, clamp up the newly sawn edge in the bench and plane to the edge using a jointer plane. The last step is to use the bowsaw again, this time to square up the ends of the nice, flat board with the parallel sides.

Using hand tools to do this kind of work is important, not so



Marking gauge determines thickness. After one face of the board has been planed flat and smooth, run a marking-gauge fence along the finished side to mark the board's final thickness. Repeat the three-plane process on the rough, unfinished side,



Use a straightedge to mark a parallel edge. Hold a pencil against the blade of a combination square, set to the desired width, and mark a line on the opposite side.



Bowsaw for ripping to final width. The saw's long blade makes it easy to take long strokes. Cut to within $\frac{1}{16}$ in. of the marked line. Finish the sawn edge with a jointer plane.

much because it makes the wood different but because it makes the woodworker different. You'll gain an acuity and respect for wood that you cannot get by being a machine operator. When you can dimension a board flat and square by hand, you'll have achieved something that only a small percentage of woodworkers can do or will even bother to attempt. You'll be a different woodworker, too. A better one.