I remember the day my 7th grade shop class teacher handed me a plane and rough-sawn plank and tried to teach me how to flatten a board. Needless to say, my efforts fell short of his expectations. For a long time, I assumed the man was clinically obsessed with flat, straight, and square, or else dreamed of becoming a drill sergeant. Many years later, the lesson finally sank in. Flattening stock may not be elementary, but it is an essential woodworking skill.

Most woodworking starts with a flat reference face. A shop full of heavy machinery can help, but there are instances when you must rely on muscle power. For example, should you ever score a clear 24”-wide plank for a tabletop, it would be crazy to rip it into smaller boards to fit your jointer and then glue them back together. On a similar (and more practical) note, when a board’s only a few inches wider than your jointer, you may not want to rip it to fit.

As much as I love using hand planes, my mama raised no fool. Like electricity, I always take the path of least resistance. My favorite approach to flattening wide boards involves a combination of hand and power tools. By practicing my technique, you’ll be able to tackle boards that are too wide for your jointer as well as flatten wide boards and tabletops with ease.
Getting Started

Of course, you’ll need a few hand planes. The sizes of the planes you use partially depend upon the size of your stock, but I find I can get by with a jack (#5) and jointer (#6 or #7). For final smoothing, I like using my #4 1/2 (see “Smoothing Savvy,” page 54).

To check for cup and bow, and to assess your progress while planing, you’ll need a couple of straightedges. For long boards, I use a straight ¼ × 1 ½ × 60” piece of cold-rolled steel. For shorter boards, I use a 24” straightedge. To check for twist, you’ll need a pair of winding sticks. They can be made from straight-grained wood or plywood, but aluminum angle from the hardware store works just as well. (The ⅛”-thick stock is straighter than the thinner stuff.)

Last but not least, you’ll need a flat and stable work surface equipped with a vise and stops to secure your boards, and a variety of wedges and shims to keep the board from shifting or rocking during the flattening process. (If your bench is a featherweight, use cast-iron weights or sandbags to keep it from sliding around your shop.)

Assess the material

After cutting boards to rough size, the next step is to evaluate your material. Tackle the biggest defects first. I try to start on the board’s “show side.” Cupped and bowed boards are the easiest to identify. Simply lay a straightedge along the length and width of the board in a few spots and look for light underneath. Mark the high spots with chalk.

Twisted boards are a little trickier. An easy way of identifying twist—assuming that your bench top is flat—is by pushing down on opposing corners and seeing if the board rocks. If it does, I use a pair of winding sticks to tell exactly how much twist I’m dealing with. I center a stick on each end of the board, crouch a few feet away from my bench, and sight across the tops of the sticks (Photo A). Once you get the hang of it, you’ll be amazed at how

Figure 1: Flattening Strategies

Using a pair of metal or wooden straightedges, sight across the top of the sticks to reveal any twist.

Mark the high spots with chalk. Insert wedges to keep the board from rocking or deflecting when planing.
accurate this method is. Mark the high corners with chalk or a pencil, as shown in Photo B.

**Flatten the face**

Before you begin flattening, it's important to secure the board to your bench. When using a tail vise and bench dogs to secure your work, apply just enough pressure to keep the board from moving. If you crank down too hard, you risk bowing the board and you'll never get it flat.

To level the high spots, some woodworkers use a scrub plane, narrow-bodied plane with a heavily cambered blade designed to remove large scallops of wood. I find a scrub plane to be a bit too aggressive for most purposes. Instead, I usually use a #5 jack plane outfitted with a cambered, or crowned blade (see Photo C, above). The crowned blade allows fast stock removal without leaving hard-edged tracks which require you to remove even more stock to make the face smooth. Plane perpendicularly or diagonally across the high spots using overlapping strokes as shown in Photo D. This step requires some muscle, but it usually goes surprisingly fast. Check your progress frequently with both a straightedge and winding sticks.

Depending on the defects you're addressing, you may not need to plane the whole surface of the board. (See Figure 1 at left).

When the winding sticks indicate that twist has been removed and the straightedge makes contact with the tops of most of the scallops, you can move on to the next step.

Here, I'll use a #6 or #7 jointer plane (depending on the size of the board) outfitted with a lightly cambered blade—about .008 inch. Adjust the blade for light full-width shavings and plane along the length of the board as shown in Photo E. This work will go a bit more slowly because the shavings should be much thinner. When scallops are leveled off and you get full width shavings, check the board with your straightedge as shown in Photo F and winding sticks. If there are any remaining

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**C**

Grind a slight crown, set the chip breaker ¼ inch back from the edge, and your jack plane is ready for scrub work.

**D**

Plane across the board to quickly level high spots. Use shims and wedges to steady the stock when doing the heavy work.

**E**

Run a jointer plane along the board’s face to skim off any remaining high spots. Skewing the plane can help reduce tear-out.

**F**

Periodically check your progress by laying a straightedge along the board and looking for light underneath.
high spots or twist, these areas can be quickly addressed by a few additional diagonal strokes of the jointer plane. At this point, your board should be reasonably flat.

**Power Up or Keep Planing**

If your thickness planer can handle your board, you’re set. Simply flatten the opposite face with the planer, and then continue to flip the board over after each pass until you reach the desired thickness. (Removing material from each side helps maintains moisture equilibrium. This minimizes future cupping, bowing, or twisting.)

If your planer is not large enough to handle the opposite face, you have two choices. You can check with local cabinet or millwork shops to see if they will run your board through their planer or wide belt sander. Or you can flatten and thickness the opposite face by hand.

Thicknessing a board by hand is basically the same as flattening the first face, except that you’re now working to a specific thickness. To do this, set a marking gauge to the desired finished thickness of the board and scribe a line all the way around the board as shown in Photo G.

Starting with your #5, scrub the face just shy of your marking gauge lines. Next, switch to your jointer plane to remove the scallops. When you approach the desired thickness, the marking gauge lines will produce a small flap of wood. A few more passes will remove the flap.

**Smoothing Savvy**

Even when I’ve used my planer, I prefer to do a final smoothing with my #4 1/2 plane. Hand-planing not only leaves a polished surface, it erases planer marks faster than a sander. Like my jointer planes, I grind a very slight camber on the blade (about .002). I set the blade tight to the mouth, and adjust the depth to take gossamer-thin shavings.

When planing by hand or machine, it’s important to pay attention to the grain. (See Figure 2 below). If your board exhibits any tear-out, try planing from the opposite direction. If all else fails, switch to a card scraper or cabinet scraper. Just be sure not to dwell in any area too long or you may create a hollow. Gradually work your way out of the trouble spot, feathering the depression out as far as you can.

**Figure 2: Going With The Grain**

On the pith side, plane in the direction of the peaks.

On the bark side, plane against the peaks.

When grain changes direction, take shorter strokes from both directions.

Set the blade to make whisper-thin shavings and skew the plane to limit tear-out. Change planing direction as needed to go with the grain.
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