

## Working Red Oak

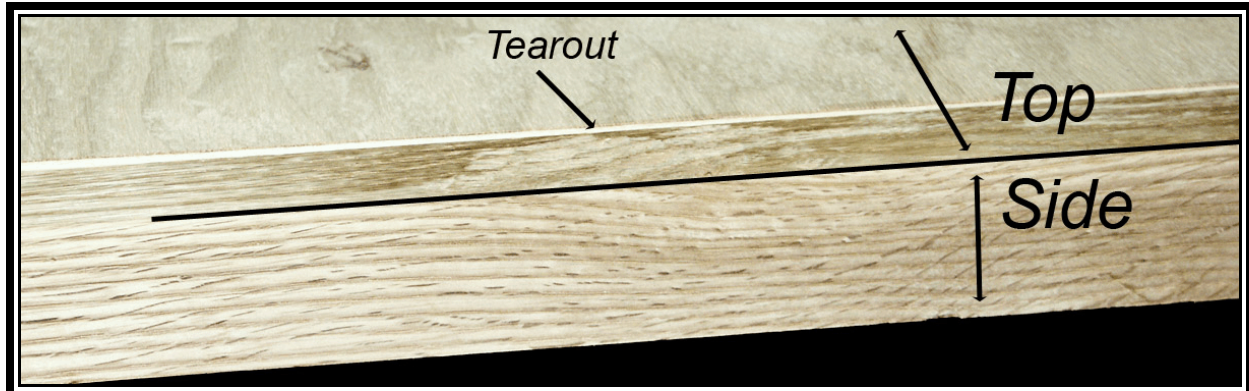
February 18, 2008

I learned five things about working with red oak, from making the Office Hutch.

1. My 115V, 15 amp. table saw (Rated at 1.5 HP, continuous) can rip 8/4 red oak quite well, at least when fitted with a thin-kerf rip blade. Difficulties occurred only if the board had not been prepared with one straight edge, or if it was not flat on the bottom. Then the saw did bog down a bit. (No surprise.) I made a very simple rip sled, which was a big help for such boards.
2. Likewise, my 14" band saw with a 1/2" blade was able to resaw 8" wide red oak boards with little problem as long as I fed it slowly enough to prevent the blade from deflecting. It certainly did not bog down.
3. Straight grained oak is reasonably easy to smooth with a hand plane, if the plane is sharp and you cut with the grain (see Reading the Grain, below). However, although I had been willing to prepare mahogany and soft maple to thickness using a power jointer and hand planes, working oak to thickness caused me finally to buy a thickness planer.
4. Irregularly grained oak (where the grain reverses) is very difficult to work with hand planes. Stock removal with a scrub plane is marginally OK but smoothing is very tedious because you need a high blade pitch (62°) taking lacy shavings (no more) or a scraper. (I should buy a toothed blade and see how that works.) I already "knew" this from reading, but now I have experienced it and had to remove a few tearouts.
5. It follows that I should specify quarter-sawn oak in the future, if possible. In any event, *I should select my boards much more carefully than I did for this project.* Buy enough, clean up one surface, then select and use only the straight grained pieces.

## Reading the Grain

All wood has to be planed "with the grain." If a very sharp plane iron is cutting *against* almost parallel but slightly rising grain, the plane requires a little more force and the surface is not quite as smooth as when the plane is cutting across falling grain. If the grain is rising more sharply, the plane is likely to dig in and tear out small chunks of wood. If you try to plane it with a low or moderate cutting angle you risk a tear out that may be very difficult to remove.



**Figure 1.** View of the top and side of a board showing irregular grain. (Black line shows the corner between the side and the top)

The best way to read the grain of a board, obviously, is by looking at the side adjacent to the surface you intend to plane. (Figure 1) You can see the general pattern of grain relative to the surface. The board in Figure 1 evidently was cut near a knot, because the grain curves in both the horizontal and vertical planes. Since the grain rises sharply, planing the top surface against the grain caused severe tearout on the top. Planing the side did not cause tearout. (I don't understand why, since the grain reverses.)

While hand planing, however, it is very helpful to be able to read the grain, to remind you of which way it is running. Although I cannot recognize many important examples of troublesome grain, I have learned to recognize some.

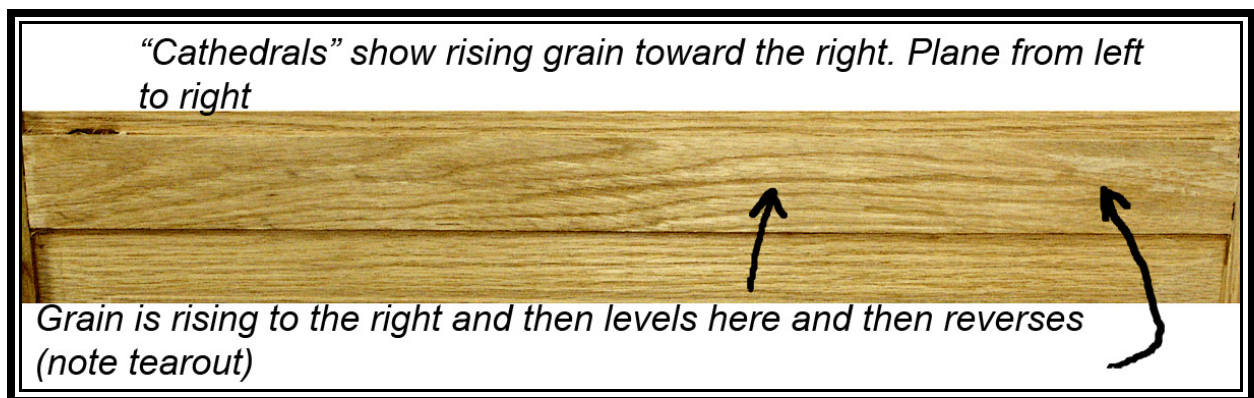
Figure 2 shows two rails on a raised panel door. Both of these were easy to plane smooth, even with a low cutting angle ( $37^\circ$ ). The top board shows the "cathedral figure." All the spires point in the same direction. The grain is rising slowly relative to the surface, as shown by the wide areas of porous wood forming the spires.



**Figure 2.** Top: "Cathedral Figure" Bottom: Straight Grain Parallel to Surface

The grain rises from left to right along the length of this board. The spires point in the direction you should plane, so it should be hand planed from left to right. [It should be fed into a jointer (face down) or thickness planer (face up) left end first.] The lower board shows straight grain that is more or less parallel to the surface. It was easy to plane well.

Figure 3 shows a board with reversing grain. On the left side, the grain rises toward the surface from left to right. You can easily see three “cathedral” figures on the left side. The spires point in the direction you should plane. (Figure 4 shows detail.) Then there is a portion in which the grain seems to be parallel to the surface, and finally at the right the grain has “reversed”. When I planed this board from left to right, it planed nicely until the last 1/7'th, where I pulled out a divot, shown by the arrow. Planing that end of the board from right to left avoided that but, of course, would cause a tearout further along toward the left.



**Figure 3.** Slowly reversing Grain



**Figure 4.** Detail from Fig 1.

Figure 5 shows a very troublesome board, of a type that I shall avoid in the future whenever possible. It has a knot beneath the surface. The grain at the left side of the board runs from left to right. The grain at the right side of the board runs from right to left. A little to the right of the center, the grain rises sharply. It is quite convoluted near the “?”

A board like that in Figure 3 seems the worst to me. Most of the board is easy to plane. The left end has a shallow angle to the grain, resulting in a long, tear-out that gets thicker as you try to finish the stroke. This is where a very tight plane mouth is important. If you get a tear-out like the one shown in the figure, it is hard to remove. You must plane it with a very high ( $67^\circ$ ) cutting angle, taking very fine lacy shavings; scrape it; or sand it. Each is slow and tedious.

A board like that in Figure 5 does not cause as long divots as Fig 3 but is still had to plane and may cause chatter marks. It, too, should be planed with a very high ( $67^\circ$ ) cutting angle, taking very fine lacy shavings; scraped; or sanded. Even at that, it may be a good idea to turn the plane  $45^\circ$  from the direction of travel to get a slicing action.



Figure 5. Board with a knot below the surface

### Finishing Oak

Sand plainsawn oak with a block. Otherwise, you will wear away the earlywood, causing ripples on the surface.

Oak, especially plainsawn, is difficult to stain evenly with oil (pigment) stain because the earlywood darkens so much and the dense latewood darkens much less. This gives it a rough visual texture, especially unattractive on large panels of plainsawn oak veneer plywood.

For a dark “English Oak” finish, Flexner recommends NGR dye or Watco Black Walnut Danish Oil, which is an oil/varnish blend containing asphalt as a dye.

For a medium brown, consider NGR dye (with or without a washcoat) or lightly tinted shellac.

For a lighter tan, apply varnish or shellac to unstained wood or tone it with lightly tinted shellac.

Oak is porous (especially red oak). Flexner recommends a more “natural” appearance that leaves the pores unfilled. Use just 1-2 coats of shellac or wiping varnish. For a very smooth surface, use a pore filler. Otherwise, plan on *many* coats of varnish with lots of leveling between coats.

### Reference

Flexner, R. Understanding Wood Finishing. 1994. Pleasantville, NY. Readers Digest Association, pp 260-262.