

A Guide to the Wayward Ways of Wood Grain

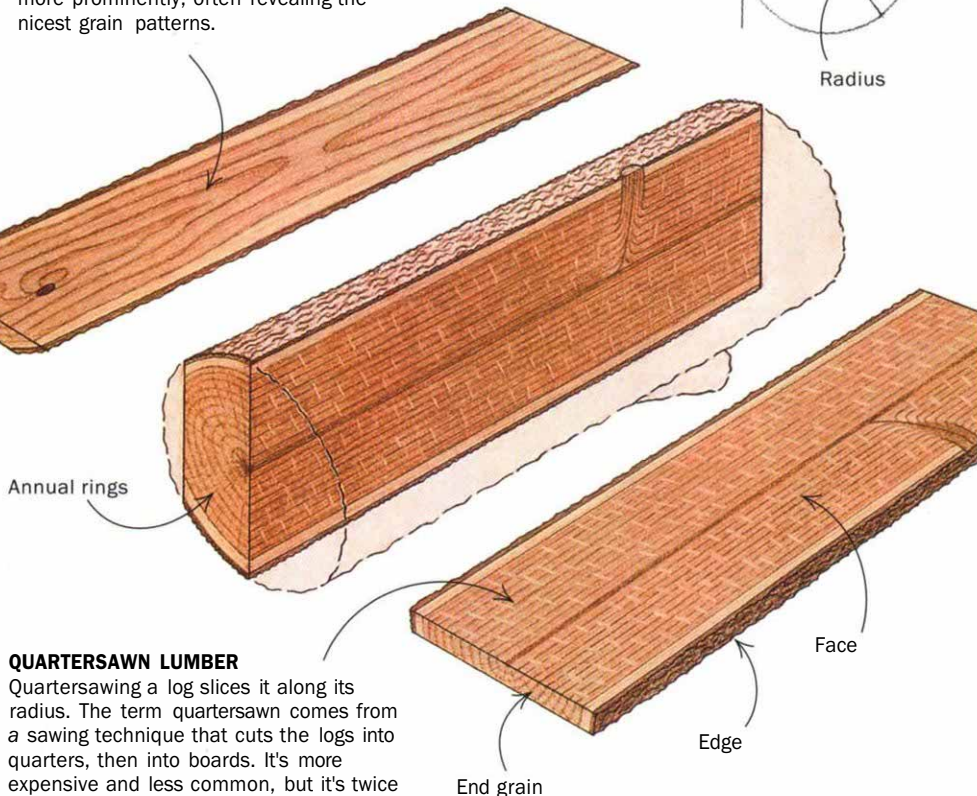
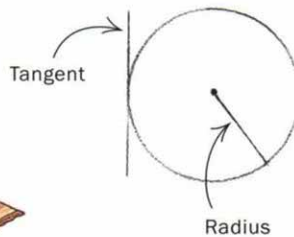
As one of our contributing editors is fond of saying, a board's grain is a bit like a cat's fur. If you brush the cat's fur in the wrong direction, you tend to make the cat hiss. Brush it in the right direction, and the cat purrs. Working wood with the grain will yield smooth boards. Cutting it against the grain will give you endless grief. Grain, however, is a bit harder to read than fur. But being able to read wood grain is an important part of working the material successfully. Grain can tell you quite a bit about a board. It can tell you where a board's strengths and weaknesses are and the direction the wood will move most. Grain patterns will also recommend the best ways to cut a particular board.

GRAIN PATTERNS DESCRIBE THE STRUCTURE OF WOOD

Lines of grain delineate the annual growth rings of the tree and, therefore, its structure. Depending on how a board has been milled, you will see flat grain, quarter grain or end grain on a board's face. Usually, though, lumber isn't cut with end grain on the face. The grain's orientation not only makes the lumber look different but also makes it behave differently (see the drawing below).

FLATSAWN LUMBER

Flatsawing a log slices it along a tangent. Flatsawn lumber is stable in thickness but tends to twist and cup. Flat grain shows the annual rings more prominently, often revealing the nicest grain patterns.



QUARTERSAWN LUMBER

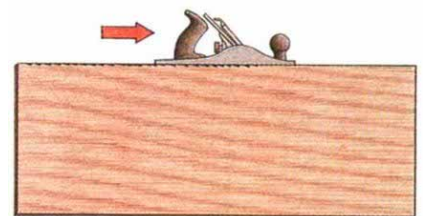
Quartersawing a log slices it along its radius. The term quartersawn comes from a sawing technique that cuts the logs into quarters, then into boards. It's more expensive and less common, but it's twice as stable in width than flatsawn and doesn't warp much. Quarter grain has a subtle figure but reveals beautiful ray patterns in oak—a feature taken advantage of by Arts-and-Crafts designers.

CUT AGAINST THE GRAIN AT YOUR PERIL

In woodworking, as in life, it never pays to go against the grain unless you must. If you don't cut a board with the grain, the blade will tear out bits of wood to remind you. When the grain is straight, you are in luck. Frequently, though, it's impossible to avoid cutting against the grain. Strongly figured woods such as bird's-eye maple have grain that goes in every direction at once. In this situation, making light cuts with very sharp tools helps. And if you still get tearout, remember that scrapers and sanders can get rid of it.

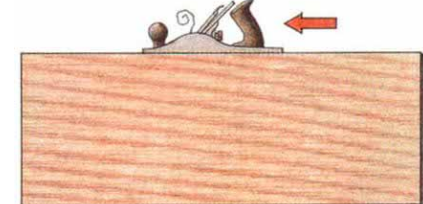
IDEAL BOARD WITH STRAIGHT GRAIN

WRONG



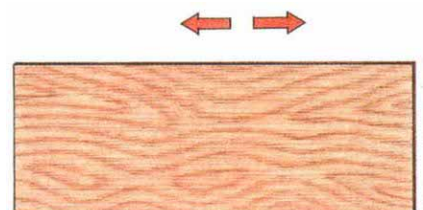
Cut against the grain and the wood will tear out.

RIGHT



Cut with the grain for a smooth edge.

COMMON BOARD WITH WAYWARD GRAIN

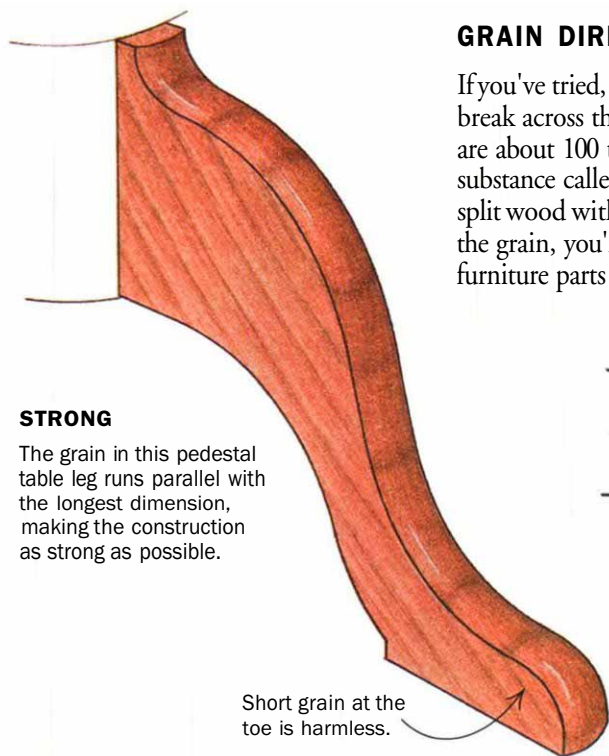


Pick the best direction, cut lightly and plan to sand.

Rules of Thumb (continued)

GRAIN DIRECTION DETERMINES A BOARD'S STRENGTH

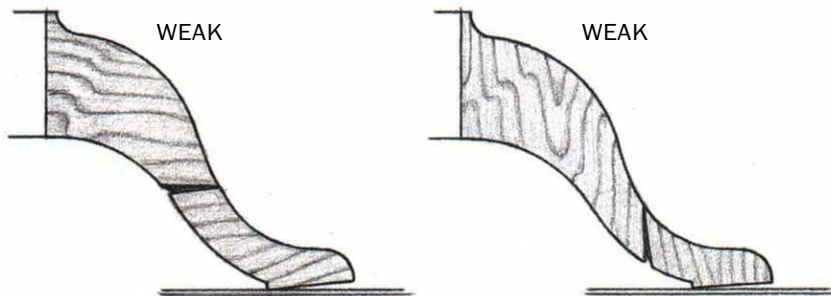
If you've tried, you know that wood is far easier to split along the grain than it is to break across the grain. This is because wood is made up of tough cellulose fibers that are about 100 times longer than they are wide. They're held together by a glue-like substance called lignin, which is much less strong than the fibers themselves. When you split wood with the grain, you're breaking lignin bonds (easy); when you break across the grain, you're snapping cellulose fibers (much harder). Though tempting, designing furniture parts with short grain is never a good idea.



STRONG

The grain in this pedestal table leg runs parallel with the longest dimension, making the construction as strong as possible.

Short grain at the toe is harmless.

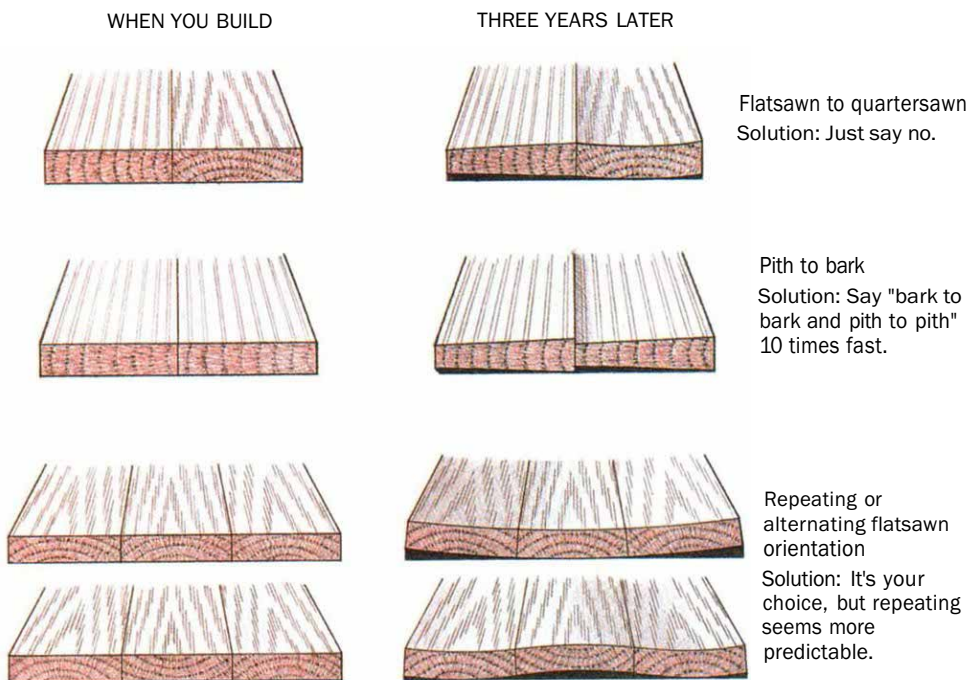


Weight of table will split the short grain in the ankles of these feet.

GRAIN EVEN TELLS YOU WHERE YOUR WOOD WILL MOVE

Wood's wayward ways are not more evident than in the way that it moves. Even after you mill a board straight, flat and square, it will grow and shrink, bend, twist and cup. Wood moves for two reasons: internal stresses in its structure and changes in moisture content because of changes in relative humidity (you can ignore this only if you live in sunny Southern California where the relative humidity never changes). Helpfully, a board's grain will tell you how much and in which directions a given board will move.

Flatsawn lumber will tend to cup toward the bark, flattening out its annual rings. Quartersawn lumber doesn't warp as much, but it can shrink unevenly in thickness, less toward the pith (the center of the tree) and more toward the bark. These reasons and others make it unwise to join boards with different grain.



WOOD MOVES AND NEVER STOPS

When wood absorbs or loses moisture from the surrounding air, it moves. Because the relative humidity can vary sharply between seasons and even between rooms (think of the proverbial damp basement and dry attic), wood expands in the summer and shrinks in

the winter. Expect a North American hardwood (such as oak) to shrink and swell about $\frac{1}{4}$ in. across 12 in. of flat grain and $\frac{1}{8}$ in. across 12 in. of quartersawn grain between highs and lows of humidity. Finishes will reduce movement, but won't eliminate it.