

# General Notes About Wood

## Hardwood Grades

If you've ever bought framing lumber, you may have heard the salesman say it's #2. That's a softwood grade that means it is strong, but not necessarily pretty. It will have lots of knots, and maybe some wane (bark along the edge). There are rules about the size, number and types of knots in the board. Because of the volume and the limited number of species (spruce, pine, fir and hemlock make up the bulk of sales in North America), softwood grading is not exactly challenging.

But if you're building casework or furniture, you will want to work with hardwood. The National Hardwood Lumber Association (NHLA, located at [nhla.com](http://nhla.com)) is an industry body that has been around for more than a century. Located in Memphis, Tennessee, it publishes grading rules that pretty much everyone in the entire industry, all around the world, has now adopted. Here are the standard grades:

### FAS:

Firsts and Seconds is the best grade, and unfortunately a lot of it is shipped to China, Japan and Europe rather than finding its way into American woodshops. It's the clearest, straightest stock a tree can deliver. It's 83-1/3% clear, with 6-inch width and 8-foot length minimums. (The board has to be at least that size.)

The 83-1/3% rule is actually a little more complicated. The board not only has to yield that percentage of clear lumber, but it also needs to be able to deliver clear parts that are minimum sizes of 4" x 5', or 3" x 7'. All of the grades have these codicils – they all have to be able to deliver different sizes of clear cuttings.

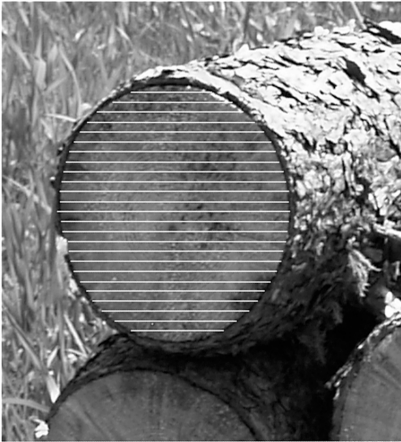
Two things to keep in mind about FAS are that it is NOT required to be totally clear wood with no knots or defects (it can have very small and tight knots), and FAS boards are graded on their lesser face.

### F1F:

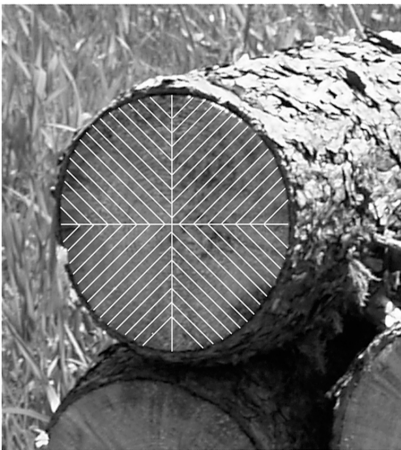
This is FAS clear lumber where one face is as good as it gets. Sometimes written as FAS One Face, it also is 83-1/3% clear, with 6-inch width and 8-foot length minimums. F1F is graded on its best face.

### Select:

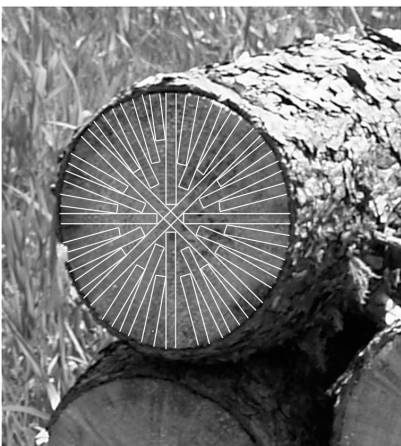
The best face is FAS, and the other face is at least #1 common (see below). Also called 1-Face, it's 83-1/3% clear, with 4-inch width and 6-foot length minimums. This is a good choice when only one face of the boards in your project needs to be virtually perfect.



**Plain Sawn**



**Quartersawn**



**Rift Sawn**

**#1 Common:**

This is the most popular furniture grade, and is often written as 1C. It's 66-2/3% clear, with 3-inch width and 4-foot length minimums.

**#2A Common:**

These are generally shorter lengths, where the quality is good enough to be used for cabinetry and furniture parts that aren't immediately visible, or are short and narrow. It's 50% clear, with 3-inch width and 4-foot length minimums. This is 'shop grade'.

**#2B Common:**

This is essentially a paint grade. It can sometimes be used for rustic furniture, and flooring. It's 33-1/3% clear, with 3-inch width and 4-foot length minimums.

**#3 Common:**

Primarily pallet material, it can be used for knotty finishes and even flooring, but is difficult to work and can misbehave badly. 3B is only 25% clear, with 3-inch width and 4-foot length minimums.

There are many, many other hardwood grades. Just about any sawmill or supplier will have its own specialty grades (there are no legal requirements), and many species such as walnut have grades that are peculiar to them. The key is to be familiar with the NHLA grades, take a look at what you're buying, and see if you can't translate what

you're looking at into an NHLA grade. That's the only way to shop around and understand the prices at different mills (that is, compare apples to apples).

Some suppliers will mix grades together, so you might be offered something such as 'select and better'. This means that all of the boards in the bunk are going to meet the Select standard, but some of them may exceed it and be either FAS or F1F. Generally this will be sold at the Select price.

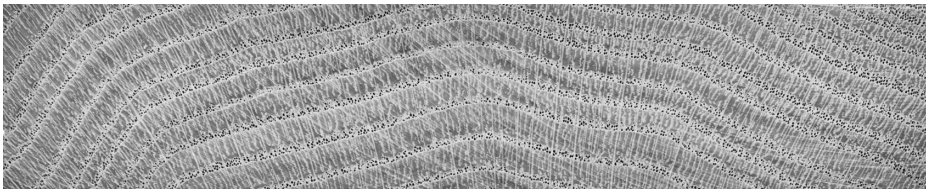
### **Hardwood Cuts**

There are two primary cuts of lumber, plain sawn and quartersawn (shown on previous page). A third, rift, is not too common except in high-end architectural millwork such as bank lobbies, fancy boardrooms and so on.

The illustration on page 2 is actually a pine log, not hardwood, but it shows the sawing patterns rather nicely.

The vast majority of the wood you will see at mills and yards will be plain sawn, which is the easiest and cheapest way to slice a log.

If you look at the end of a plain sawn board (below), the grain shows as a series of arcs. If you look at the wide faces of the same board, the grain has a familiar 'cathedral' pattern. It has arches through the middle, and tighter, almost straight grain near the edges. For furniture and cabinet builders, the problem with this cut is movement.



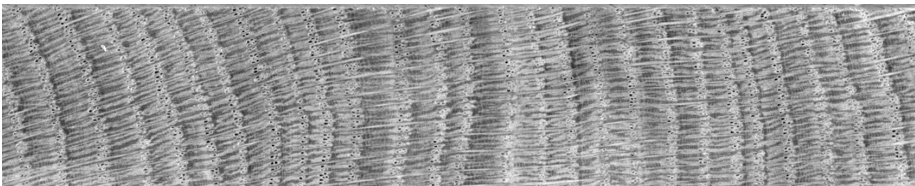
Wood expands and contracts across the grain. There is hardly any change in the length of boards, but their width can alter dramatically with variations in humidity and temperature. Boards can still move even decades after they have been dried and used. That's because they are fibrous, and those fibers are made up of cells that can absorb water from the air. The cells are long and thin, and when they get damp they swell (like paper towels, which of course are made of wood). Because of their shape, the cells swell far more in width than in length. Many common furniture species will move an eighth of an inch per foot, and some even more.

Before we had plywood, all cabinet door panels were made of solid wood. Many still are, but the professionals have figured out a few things over the years. If you look at cabinets from a few decades ago, and you do so in the middle of winter in a northern U.S. state, you'll probably see a line around the edge where the panel meets the frame. Look closely and you'll see that the wood there is unfinished. That's because the door was assembled before it was finished with a topcoat such as shellac or varnish. When the furnace comes on in winter, it dries the air and the wood in the panel and the frame shrinks, revealing a thin area near the edge of the panel that was tucked inside the stiles (frame sides) when the finish was applied.

Today, most panels are built with materials that don't move. They may be a laminated multi-ply (very thin layers of veneer with each lamination oriented 90 degrees to its neighbors), or perhaps a veneer has been laid on a fiberboard core. If the panel is solid wood, it will be pre-finished before assembly. And it may not be plain sawn.

Another problem with this cut is that the edges of the board have memory due to their grain structure, so they want to react and curl away from the pith (the center of the tree). In the photo on page 17, the edges would move up. That results in a cupped board.

If you look at the end of a quartersawn board (below), the grain runs in short lines from one wide face to the other. Quartersawn boards move a whole lot less across their width than plain sawn boards, which is why furniture builders often prefer them. Virtually every piece of white oak that Gustav Stickley used to build his Mission style furniture was quartersawn. He valued its pleasant appearance (parallel lines of grain), but also its inherent stability.



This cut is quite a bit more expensive than plain sawn, so many furniture builders reserve it for critical components such as legs and door frames – thinner elements that need to remain absolutely straight. Take another look at the photo on page 3. Notice how the grain at the left side is almost vertical? Yankee craftsmen, known for their thrift, discovered a long time ago that they could harvest rift and quartered grain from the edges of some plain sawn boards without

having to pay a premium price. Of course, it doesn't work for all boards, but if you only need small quantities, it's worth checking your lumber rack...