

Hardwood Lumber Grades

There's a method to the madness

by David Sloan

I've bluffed my way through many a lumberyard. I learned young. When I was a kid, I wanted a big hunk of maple to make a rifle stock. At the lumberyard, the man in charge pointed to a pile of thick maple planks. "Come and get me when you've found what you want," he said. I did, and for years afterward, that's the way I bought wood. Whenever I'd hear lumberyard lingo like "FAS or number one common, sir?", I'd put on my poker face, give a knowing nod, and say, "Sure. Uh, do you mind if I look through the boards?" I didn't have the slightest idea what lumber grades like FAS or No. 1 common meant, but I knew a nice board when I saw one.

My bluff worked fine until I bought wood for a big job. I didn't have time to pick through a hundred oak boards, so I went with a grade called No. 2 common because it was cheap. Much to my dismay, there was a short, narrow, knotty board for every nice one that came off the truck. I suggested that the knots added character, but my customer didn't agree. I had to order more oak, and ultimately lost money on the job.

That lesson motivated me to learn about lumber grades. I picked up the basics from books. Recently I rounded out my education by attending a three-day log-, lumber- and tree-grading workshop in Indiana, where I even got to do a little grading myself. Purdue University and the Indiana Hardwood Lumberman's Association sponsor several of these workshops each year. Attending one is a good way to learn about hardwood grading. (For information, write to Daniel Cassens, Dept. of Forestry and Natural Resources, Purdue University, West Lafayette, Ind. 47907.)

Grades provide the basis for determining lumber quality and price. The *concept* of hardwood grading is simple: a high-grade board must have more clear, defect-free surface area than a low-grade board. The grading system provides standards for defects and board size, and equations for calculating clear surface area.

The standard grades of hardwood lumber are (from best to worst) firsts and seconds (FAS), selects, No. 1 common, No. 2 common, and No. 3 common. There are special grades for certain species, but in general the standard grades are what you'll find. The chart on p. 38 describes the top four standard grades. No. 3 common boards aren't suitable for furniture, and usually end up as pallets or shipping crates. Familiarity with the top four grades will get you through most situations, although lumberyards rarely stock all four. Some yards will have only FAS and No. 1 common; some will sell a mix of the top two grades and call it "selects and better"—it varies from yard to yard. Increasingly popular is a non-standard grade called "FAS one face" (abbreviated F1F). In this grade, one board face will



To choose the grading face, grader Wally Cole flips a red-oak board with his steel-tipped lumber rule. Cole marks a grade with his crayon-tipped wand and records the surface measure and grade in the logbook in his left hand.

Calculations make the grade

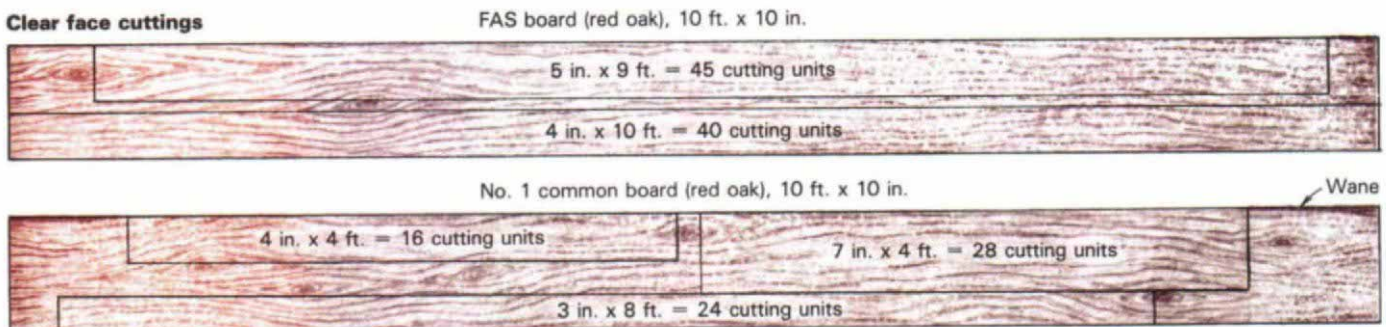
The drawing below shows how a grader visualizes clear face cuttings on the board's worst face. To make the grade, the cuttings must exceed minimum size and contain enough cutting units to meet minimum requirements based on board surface measure (SM). One cutting unit = 12 sq. in. (i.e., 1 in. x 12 in., or 2 in. x 6 in.). Both boards shown have an SM of 8 (SM = [width in in. x length in ft.] ÷ 12; drop fractions under ½). The chart gives the minimum cutting sizes and maximum number of cuttings permitted. To determine minimum number of cutting units required, multiply SM by a conversion factor (10 for FAS and selects, 8 for No. 1 common, 6 for No. 2 common).

Minimum standards for hardwood grades

Standard grade	Minimum board size* (width x length)	Minimum size of clear face cuttings* (width x length)	Minimum % of clear surface area on graded face	Maximum number of cuttings permitted:	
				SM	Cuts
Firsts and seconds or FAS (two separate grades combined and sold as one)	6 in. x 8 ft.	4 in. x 5 ft. or 3 in. x 7 ft.	Firsts: 91⅔% Seconds: 83⅓%	4 to 7	1
				8 to 11	2
Selects (graded on best face)	4 in. x 6 ft.	4 in. x 5 ft. or 3 in. x 7 ft.	91⅔%	12 to 15	3
				16 and over	4
				2 to 7	1
				8 to 11	2
No. 1 common	3 in. x 4 ft.	4 in. x 2 ft. or 3 in. x 3 ft.	66⅔%	12 to 15	3
				16 and over	4
				1	clear
				2 to 4	1
				5 to 7	2
No. 2 common	3 in. x 4 ft.	3 in. x 2 ft.	50%	8 to 10	3
				11 to 13	4
				14 and over	5
				1 to 3	1
				4 and 5	2
				6 and 7	3
				8 and 9	4
10 and 11	5				
12 and 13	6				
14 and over	7				

*May vary for some species.

Clear face cuttings



grade FAS, and the other face No. 1 common or better.

Here's how grading works. Boards aren't graded by their overall appearance, as you might think. The system is based on the assumption that a hardwood board will be cut into smaller pieces to make furniture parts, flooring, etc. Boards are graded by overall length and width, and by the size and number of imaginary "clear face cuttings" (the furniture parts) that the lumber grader visualizes (no actual cutting is involved) in between knots and other defects on the board's *worst* face. One grade, selects, is graded on the best face; F1F is graded on both faces. No unsound defects, such as large holes, loose knots or wane, are allowed on the reverse side of the imaginary cutting. The higher the grade, the wider and longer the clear cuttings have to be, as shown in the drawing above.

In addition to the size of these clear cuttings, the grading rules also specify the number of cuttings a board must contain to make a grade. That's not all. When the surface area of all the clear cuttings in a board is added up, the total must exceed a specified minimum requirement. The surface area of the cuttings is measured in cutting units. One cutting unit equals 12 sq. in. of board surface. (To find the number of cutting units in a cutting, multiply width in inches times length in feet.) The total

number of cutting units required varies for each grade and also within each grade, depending on the board's overall surface area. Two boards that are exactly the same size with the same number of defects and the same amount of defect-free surface area could end up as different grades—the *location* of the defects could prevent a board from having large enough clear cuttings to make the higher grade.

The defects in between the clear cuttings can vary drastically from board to board within a grade. They could be tiny knots, but are just as likely to be holes or large knots. There are size limitations for knots and holes, but in general the grading system isn't concerned much with the defects, only the clear wood in between.

The actual rules for determining grade are ridiculously complex, but they work. To make things even more complicated, grading rules differ somewhat depending on the species. For example, in cherry the "clear cuttings" may contain tiny knots. The National Hardwood Lumber Association's pocket-size rule book (\$3 from PO Box 34518, Memphis, Tenn. 38184) gives all this information. It reads like the instructions for an IRS tax form, but it's worth having if you want to understand lumber grading. And if you buy lumber in quantity, it's essential.

After reading all this, you may conclude that the grading sys-

tem has little relevance to small-scale woodworking—a valid point, perhaps. The system was designed to meet the needs of the lumber and wood-products industries, not the individual woodworker; without the rules, million-board-foot lumber transactions would be impossible. But if you understand it, the system will enable you to buy and sell boards in quantity, sight unseen. When you specify a grade, you don't have to examine the boards to know, very specifically, what you're getting in a shipment. If there's a dispute between buyer and seller, out comes the rule book. The grade can be verified by measuring the board in question and making a few calculations.

Every decision in the lumber business, from the felling and bucking of the tree to the sawing and edging of the boards, is made with one thought in mind: produce as many high-grade boards as possible. The more high-grade boards a log yields, the greater the profit for all concerned. A wide board that would make some woodworkers swoon with delight will be ripped in two if doing that will raise the grade.

So how can you tell which grade to buy? If you need only a few boards, or you're concerned with a board's overall appearance, you're better off using my old trick of picking out what you want. (Be considerate. Ask permission before you pick, and restack any boards you move.) The best boards will always be in the FAS pile, but if you want to save money, look in the No. 1 common pile first. You'll find a few nice boards. The difference in retail price between an FAS board and a No. 1 common board is roughly 40% (for red oak), but sometimes the difference in appearance isn't that great. A knot that was a defect in the grader's eyes may be pleasing to yours.

When you need a quantity, say, 50 bd. ft. or more, the law of averages starts to work and you can buy blind by grade alone. Not surprisingly, the NHLA rule book ignores aesthetics. In the real world, however, any large single-grade order will contain nice boards, ugly boards, and boards in between. The larger the order, the more likely it is that you'll have an even distribution of nice, ugly and in between (remember statistics in high school?). So when buying by grade, it's always a good idea to order a little more wood than you'll need, to allow for waste. The lower the grade, the more waste you should expect. You'll have minimal waste with FAS or selects, but you'll pay more.

Even if you want perfectly clear stock, you may not always need to buy FAS for every furniture project. The chart gives the minimum sizes for clear cuttings in each grade. These are the smallest clear pieces that you can expect to get out of a board. Consider what size pieces of clear stock your project requires and buy the lowest grade that will give you that size. If only one side of the board will show, buy selects (or F1F) instead of FAS. The cuttings are the same size as FAS, but selects cost a little less.

What if your project requires long, wide, pretty boards and you don't need a lot of little furniture parts? Pick if you can. On a big job you may have to buy blind. The chart gives you the minimum percentage of clear surface area you can expect on the graded face. If money's no object, play it safe and buy FAS or selects. In these grades you'll have wider boards and fewer defects. But if, like me, you don't mind a few knots in the middle of your pet project, or gluing up narrower boards, you can usually save money by ordering No. 1 common. You'll get a few ugly boards, and roughly 17% less clear wood than with FAS, but each board foot will cost about 40% less. And besides, those knots add character, remember? □

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A grader in action

Grading requires a lot of measuring and a lot of math. When you're learning—juggling unfamiliar tools, rules and numbers—it seems to take forever to grade just one board. George Screpetis from Pineville, La., an instructor at the Purdue University grading workshop I attended, said that a pro spends only a few seconds with each board. Fumbling as I was at the time, that was hard to believe. It took me a few seconds just to get my grading rule book out of my back pocket. I decided to see for myself.

Wally Cole is a professional grader at Cole Bros. Lumber Co., a sawmill in Woodbury, Conn. He's an amiable young man, in his early thirties I'd guess. The afternoon that I stopped by, I found him standing on the grading platform armed with the tools of his trade: a lumber rule, a crayon-tipped wand and a logbook. As the newly sawn and edged red-oak hoards shuttled along on the roller-chain conveyor that crossed the platform, he quickly eyeballed each board's length and measured its width with his lumber rule. A scale printed on the rule gave him the board's surface measure (surface area in square feet). Giving the board a quick flip with the steel-tipped rule and his boot, he chose the worst face for grading, mentally calculated the required number of cutting units and visually laid out the clear face cuttings. Then, with a flourish of his crayon-tipped wand, he marked the board with a grade symbol. As the graded board moved down the conveyor, he licked off the grade and surface measure in his logbook. Two handlers working with him stacked the hoards into piles by grade. The entire grading sequence took only a few

seconds for each board, just as George Screpetis had said.

A good grader like Cole can grade as much as 10,000 bd. ft. in an 8-hr. shift. Graders often get paid by the hoard foot, so speed is just as important as accuracy. Sometimes Cole seemed to do nothing more than flip a board with his rule before he marked a grade. In fact, he was so fast that I couldn't wind, focus and shoot my camera fast enough to keep up with him. "The best boards grade themselves," he explained. A defect-free board takes only a glance, because if it's large enough to make FAS, no further scrutiny is needed. It's automatically FAS.

Cole was grading to fill an order. The customer had specified standard FAS, F1F. No. 1 common and No. 2 common. If a customer's specifications differ from the standard grading rules, Cole will grade to meet those specs.

I asked if some species were more difficult to grade. Cole said that red oak is one of the easiest woods to grade green because it doesn't have unusual characteristics. Yellow poplar, also being sawn the day I visited, is tougher to grade because it has tiny burls that look like knots at first glance. The burls aren't considered defects in poplar, but knots are, so the grader must check each board carefully to avoid confusing the two.

Hardwood boards are often graded twice: once green, and again after kiln-drying. Since the boards are already graded when they go into the kiln, the dry-grader regrades only boards that have drying-related defects that would cause a drop in grade. Hoards more than 10 in. wide are usually picked out at the second grading and sold at a premium. —D.S.