

# A Closer Look at Solid-Wood Flooring

The ins and outs of an enduring favorite

BY ANATOLE BURKIN

**S**olid-wood flooring has enjoyed a reputation for durability and beauty for centuries. Many older homes sport original flooring that's still in excellent condition after enduring generations of activity. With traffic and time, a wood floor develops a character and charm that's hard to beat, making it a perennially popular choice.

Whether the flooring is new or reclaimed, domestic or imported, wood offers an almost unlimited variety of finishes and can be sanded and refinished several times over its life span. The finish can simply draw out the natural character of the wood, or in the case of dye, stain, or pickling, it can color the wood. Depending on how it was cut, it can range from mild to wild in appearance. The surface can be sanded smooth (no "crumb catchers" in the kitchen), or it can be left with or given a rustic and textured look. In residential construction, solid-wood flooring is used extensively, especially in higher-end homes, because of its many creative installation possibilities, its long life span, and its purity.

In the April/May 2015 issue of *Hardwood Floors* (the magazine of the National Wood Flooring Association), contractors reported that red oak had 43% of the U.S. market, followed by white oak at 26%. According to the NWFA, traditional 2¼-in. red-oak strip flooring is still the favorite, but there's been a trend toward wider and longer planks and toward random-width installations (a mix of 3-in., 4-in., and 5-in. planks). Also, gray colors are currently popular, as are highly figured woods containing mineral streaks, prominent grain, and knot holes.

More imported species are coming to market as well, most of them tropical woods. Flooring companies sometimes like to give them common names, but American cherry has about as much in common with Brazilian cherry as an old fashioned does to a caipirinha. Both are fine choices but wholly different flavors.

## Properties and parameters

In the marketing of flooring products, you may see the phrase *solid wood* to describe materials that contain real wood layered onto processed substrates; that product is known as engineered flooring. Solid-wood flooring as discussed here consists of 100% real wood with no substrates.

Solid-wood flooring for residential construction is typically ¾ in. thick, with tongue-and-groove joints along the edges. It can be refinished (sanded and



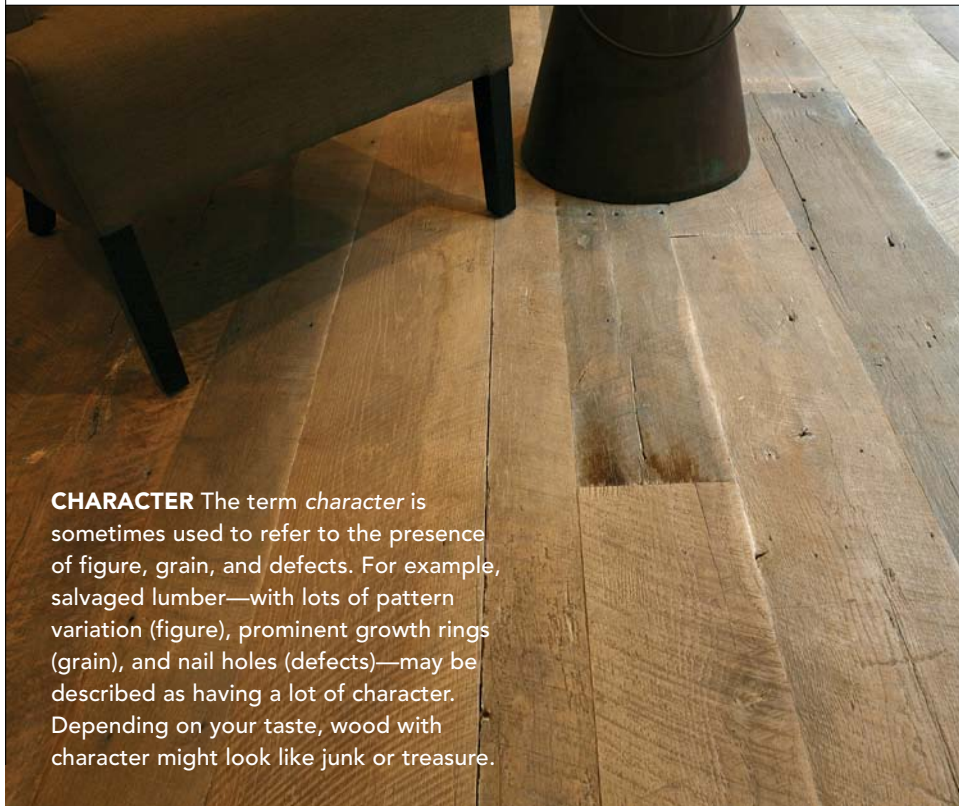


**Stunning variety.** Unlike a prefinished floor, where beveled edges disrupt the surface and gather dirt, unfinished solid-wood flooring can be sanded flat. This makes it possible for different lighting conditions to draw out a floor's dynamic characteristics, such as with this quartersawn white-oak floor.

# KNOW THE LINGO

The terms *grain* and *figure* are often used interchangeably, but there is a difference. Figure is the more important of the two because it describes the most visible features of wood aside from color. When examining flooring, ask questions about how uniform or varied the wood's appearance will be from one board to the next. Flooring samples can appear remarkably uniform, but a larger presentation of the product has a far greater range of figure and color. It helps to know some of the basic terminology used to describe wood and flooring. Here's a quick guide.

**GRAIN** Grain is the path in which wood fibers flow, the direction in which wood splits. In flooring, grain runs in the long direction of the strip or plank, which gives it strength. Grain can range from *open* (visually prominent), as with oak, to *closed* (visually subtle), as with maple.



**CHARACTER** The term *character* is sometimes used to refer to the presence of figure, grain, and defects. For example, salvaged lumber—with lots of pattern variation (figure), prominent growth rings (grain), and nail holes (defects)—may be described as having a lot of character. Depending on your taste, wood with character might look like junk or treasure.

**COLOR** There are two aspects to color: the natural color of a type of wood and the stain or dye applied to it during finishing. Stains have pigment, and that pigment lodges in the pores of the wood, making for dramatic patterns. Dyes are more uniform and so tone the wood more evenly. Sometimes both are used. These are aesthetic choices, and more of them are available when working with unfinished flooring.

coated) four or more times before needing replacement. The sanding process removes approximately  $\frac{1}{16}$  in. of material. Because the solid-wood layer is thinner on most engineered products, it is likely that it can be refinished only once or twice.

Brett Miller, vice president of education and certification at the NWEA, explains how a solid-wood floor can last for such a long time: “Aesthetically, the thickness of a floor makes no difference at all. Once it’s installed, you won’t be able to tell. The thickness of the wood above the tongue, however, will ultimately determine how many times the floor can be sanded and refinished during its service life. When properly maintained, wood

floors can last for hundreds of years, and if repairs or sanding are required, a wood-flooring professional will remove only a small fraction of the actual flooring material. The thicker the flooring above the tongue, the more times this can happen.”

Al Dobrin, sales manager and director of Amber Flooring, a custom residential and commercial flooring company in Emeryville, Calif., says that thinner material is typically used when matching a new floor to an existing floor that has been sanded down in thickness. However, the amount of material below the tongue must match the existing floor so that the replacements do not ride above the subfloor.

With solid wood, you gain the assurance that dings and scratches will still look natural and add character, in contrast to an engineered product that, if damaged to the core, will have a different color and texture than its surface.

## Wood grain and movement

Even after wood has been cut and dried, the material will swell and shrink with changes in temperature and humidity. That’s because the cells of wood are like sponges, absorbing and releasing water vapor, depending on atmospheric conditions. Floor finishes have only some vapor-retarding capability, and of course, the flooring’s underside is unfin-



**FIGURE** Figure describes the patterns in wood, many of which are unique to a particular species. Examples are ray fleck in quartersawn white oak, quilted patterns in maple, and ribbon shapes in mahogany. Not all woods exhibit dramatic figure, and it can vary greatly depending on how the wood is cut. Natural color variations within a wood such as hickory can produce what's called pigmented figure.



**TEXTURE** The oldest wooden floors were smoothed with hand tools, which left behind tool marks. During the Industrial Revolution, machines made smooth, flat floors easy to produce, so they became the norm. Today, texture choices include “hand-scraped” (usually done by a machine), smooth, and wire-brushed. At left is an example of hand-scraped maple.



**GRADE** Wood is graded for quality with the terms *clear*, *select*, and *common*. Clear is the highest grade, and select has fewer of the defects, such as knots and sapwood, found in common wood.

**FINISH** Most prefinished floors come with a topcoat that contains aluminum oxide, which toughens the finish. On-site finishing offers durable choices (see “Choosing the right finish,” p. 52), but none can match a factory-applied finish. However, a prefinished floor has beveled edges where dirt and crumbs can gather.

ished. Floors expand and contract along their width; longitudinal movement is minimal.

In the book *Wood Flooring: A Complete Guide to Layout, Installation, and Finishing* by Charles Peterson with Andy Engel (The Taunton Press, 2010), the authors note the following: “Moisture can cause a wood floor to expand to such an extent that it actually moves the walls of a building. It takes over 1000 lb. per sq. in. to crush the wood cells of a red-oak board, yet many oak floors that have failed because of moisture-driven expansion have permanently crushed boards.” That shouldn’t turn you away from solid-wood floors. To the contrary, it illustrates how tough solid-wood flooring is.

How much a particular wood moves depends on two things: the individual species and how the material was cut at the mill. The greatest amount of wood movement occurs tangentially to the growth rings, which is how flat-sawn wood is cut. The least amount of wood movement occurs radially to the growth rings, which is how quartersawn wood is cut. How wood has been sawn also affects the grain pattern and figure, important aesthetic considerations when choosing flooring.

For example, for a classic Craftsman-style floor, one might choose quartersawn white oak. Sawing white oak radially exposes a dramatic feature called ray fleck. Quarter-

sawn (also known as vertical grain) wood moves less than flat-sawn, but that’s not to say one should avoid flat-sawn wood for flooring. Flat-sawing is the most efficient way to cut a log, minimizing waste and allowing for wider boards. It also reveals pleasing cathedral patterns in the grain.

Installers should check the moisture content of wood before it’s installed in accordance with the regional standards set by the USDA’s Forest Products Laboratory. Flooring should be delivered a week or more ahead of time, left to acclimate, then installed with ½-in. expansion gaps along the walls. That way, the entire floor can expand and contract freely, like an elastic waistband. In



new construction, where job sites can be damp from exposure to the elements, it's important that subfloors be allowed to dry and that wood flooring be installed at the very end of the job.

### Installation and finishes for solid-wood floors

Despite the limited options, about 70% of consumers now prefer a factory finish, according to the NWFA. There are several reasons for this: Factory finishes are the most durable and come with long warranties, flooring installation is quicker and cheaper, and there is no waiting period while installers go through the time-consuming steps of sanding (which is also dusty) and applying several coats of finish.

For homeowners looking for something more specific, floors finished on-site present endless possibilities. Dyes and stains can be custom blended to match the room's decor or even the existing wood trim or existing floors. Additionally, stencils, decals, and other decorative details can be applied to a floor before the protective topcoat is added.

Ron Cutler, sales consultant and installation manager for The Floor Store in San Francisco, outlines the finishing process his company follows: "For the finish, we typically stain and seal it, then apply two to three topcoats. With water-based finishes, it takes about seven days to fully cure. With oil-based finishes, it can take about a month to fully cure." However, floors can be walked on two days after a water-based finish is applied and three to four days for oil-based.

"When you sand the floor, you end up with a flush edge," Cutler continues. "And any gaps can be filled." That look is not possible with prefinished flooring, where there's a slight "rollover," or bevel edge, between planks as a result of finishing and milling. Also, with prefinished flooring, you have to accept a height variance between planks that's about the thickness of a credit card.

According to the NWFA, water-based finishes are the most popular today, accounting for 51% of all finishes, followed by oil-modified (36%), conversion varnish (4%), oil (4%), and finishes such as wax making up the rest. "Matte and low sheens are the most popular," says Miller.

That said, custom finishes (see "Choosing the right finish," left) such as waxes can give a floor a warm, natural look unlike that produced from a factory finish. According

## CHOOSING THE RIGHT FINISH

Tadas Wood Flooring of Naperville, Ill., specializes in refinishing hardwood floors. The company has tested many products over the years and has developed a guide that sheds light on the durability of different types of floor finishes.

Type of finish		Two-part water	Single water	Oil-based	Swedish finish	Moisture-cure	Penetrating and wax	Hardwax oils
Durability	Wear	5	4	3.5	4.5	5	3	4
	Scratch	4.5	4	3.5	4.5	5	3	4
	Chemical	5	5	4	5	5	2	4
Other factors	Looks	4	4	5	5	5	5	5
	Aging	5	4	3	3	3	5	4.5
	Fumes/odor	5	5	3	1	0.5	3	5
	Maintenance	4	4	4	4	4	3	5
	Time	5	5	4	3.5	3.5	3	5
<b>Totals</b>		<b>37.5</b>	<b>35</b>	<b>30</b>	<b>30.5</b>	<b>31</b>	<b>27</b>	<b>36.5</b>

The numbers represent the opinions of the testers and are averages for the product categories. Specific products may perform better or worse. 5 Excellent 4 Very good 3 Good 2 Fair 1 Poor 0 Horrible

to Dobrin, “A wax finish can be applied throughout the house, depending on traffic, and on average requires a new coat about every couple of years.”

Adam Williams, marketing manager of the NWFA, says, “Durable film-forming prefinish options include moisture-cure urethanes, acid-cure urethanes, two-component waterborne urethanes, UV finishes, and aluminum oxides. Which is more durable is debatable.”

### A designer’s perspective on choosing wood flooring

Yana Mlynash, an interior designer from Mountain View, Calif., takes a logical approach with her clients when it comes to remodeling. “I always pick cabinets and countertops first and then move to floors,” she says. “It’s not that hard to eliminate the flooring options since many times it’s about price, what is already in the house, and what is best for the family’s situation.”

But there’s more to consider than simply the final product. Some families need a highly durable material (see “What’s hot under your heels,” right) for children and pets. Mlynash says, “You want to look at the hardness level of the floor.” Oak and hickory do an excellent job of hiding scrapes and dents, especially when the flooring is salvaged.

In a remodel, choices may be limited if you prefer continuity throughout the house. “Many homes, at least in Northern California, have oak flooring,” Mlynash says. “In order to not rip out the entire house, many clients choose to match the floor and sand and finish the entire house. This removes all the spotting from furniture or carpets and gives you the option of going lighter with a new stain,” she said.

Unlike carpet, which can be difficult to keep totally free of mold, mildew, and dust mites, wood flooring comes clean with less effort. “Wood floors are very good for your health,” says Mlynash. “They are softer than tile and easier to clean than carpet.”

Shopping for flooring is a bit like buying clothes for an outfit: You need to think about how it ties together and maintain age-appropriateness. In terms of a house, that means choosing a floor durable enough to meet the tastes and tests of time, which is why solid-wood flooring is here to stay. □

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## WHAT’S HOT UNDER YOUR HEELS

In the United States, domestic species are by far the most commonly chosen woods for flooring. The oaks still rule, followed by maple. Among imported species, Brazilian cherry is the most popular. Below is a list of woods that details their popularity and where they are situated on the Janka hardness scale, which measures the force required to drive a 0.444-in. steel ball into the wood until half its diameter is embedded.



Source: Survey of flooring contractors as reported in the April/May 2015 issue of *Hardwood Floors*, the magazine of the National Wood Flooring Association.