

## Selecting, Specifying and Building with

# Wood Products

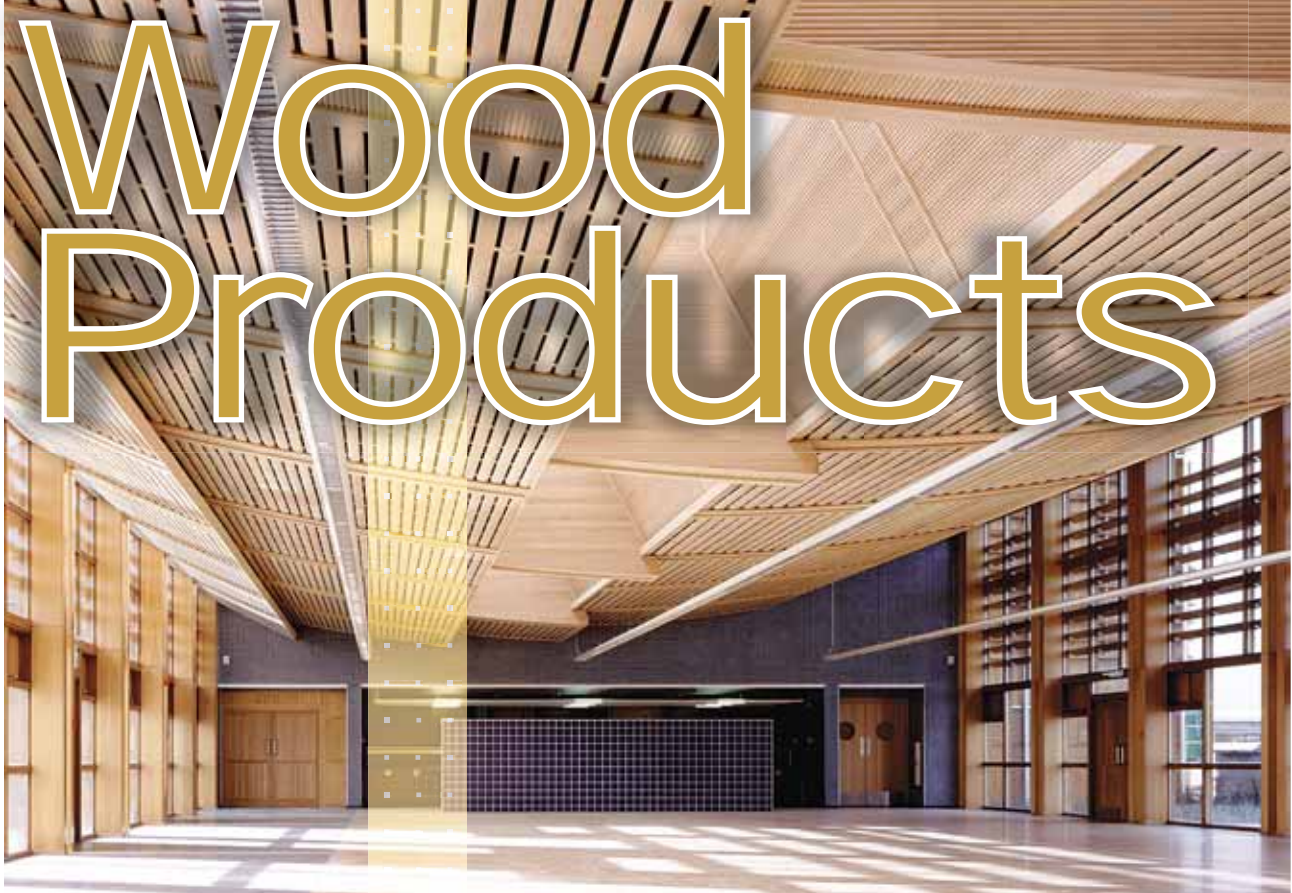


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### Learning Objectives

After reading this article, you should be able to:

- ✓ List several wood species and explain how they differ in recommended applications and expected building performance.
- ✓ Discuss the factors that influence the selection and performance of wood finishes for floors, walls, and ceilings.
- ✓ Explain how to specify and treat wood used for building exteriors.
- ✓ Understand what is meant by “certified wood” and other issues related to the sustainability of lumber and finish carpentry wood.

By C.C. Sullivan and Barbara Horwitz-Bennett

**D**o cell phones make people want oak parquet floors? In 1982, John Naisbitt and Patricia Aburdene predicted, in their best-selling *Megatrends: Ten New Directions Transforming Our Lives*, that the explosion of high-tech equipment and gadgets would create an innate desire for organic, “high-touch” building materials to balance the digital with the natural. Many of Naisbitt and Aburdene’s “predictions” have fallen by the wayside, but they may have been right about society’s continuing and seemingly natural attraction to organic building materials, particularly wood.

Building Teams can articulate the reasons in terms that matter to end-users. “There is visual warmth and depth to wood that cannot be had with most other materials,” says Dwight D.M. Lander, managing architect with Canadian firm MMMC Architects, Brantford, Ont. “The natural quality of the material implies imperfections and variations in texture that human-made materials

Opened in 2002, this European Commission building (above) outside Dublin uses ceiling slats of American ash. Wood border (top) © Mark Niederman, courtesy Janos P. Spitzer Flooring Co.

cannot fully duplicate. It is these variations that allow wood to bring a dimension to a space that is always unique.”

Although wood interiors have been a long-favored residential choice, more and more nonresidential projects are incorporating wood floors, ceilings, and wall systems, particularly in office suites, lobbies, banks, retail settings, hotels, convention centers, and healthcare facilities.

“Wood is one of nature’s most beautiful materials,” declares Janos Spitzer, president of the decorative specialist Janos P. Spitzer Flooring Co., New York, N.Y. “The inviting warmth of wood enhances the décor of any room.”

Duo Dickinson, AIA, principal and founder of Duo Dickinson Architect, Madison, Conn., says, “The two ways that wood enhances nonresidential projects are through its extraordinary durability in use and its visual durability over time. Wood can take a licking and still keep ticking, and after the material has been through the wringer a few times, its ‘distress’ is often viewed as a positive feature.”

**HOW TO SPECIFY WOOD SPECIES**

Given nature’s beautiful palette of wood species, designers have literally hundreds of choices when it comes to the types and cuts of wood. Of course, some species are more suited for specific applications, and such factors as hardness, appearance, cost, and resistance to decay need to be evaluated as well.

“When choosing a wood species, follow this formula,” instructs Spitzer, whose wood-flooring designs have contributed to the Beijing Olympics National Stadium and Bloom-

berg Tower in Manhattan. “Select a wood for appearance and then make sure it is suitable for the particular use. Is it hard enough? Is it stable enough? Is it overly photosensitive? How much does it cost, and is it available?”

To help answer these questions, Spitzer recommends consulting the Janka hardness scale (Figure 1), which measures the relative hardness of woods based on the force required to embed half the diameter of a 0.44-inch steel ball into the wood—the higher the number, the harder the species of wood. You can also reference the “relative dimensional stability” chart (Figure 2) on the National Wood Flooring Association’s website [www.nwfa.org](http://www.nwfa.org). It may also be advisable to consult an experienced supplier, who can advise you on how stability translates into installed performance for your specific application.

Before drilling down to such factors as hardness and durability, however, the first aspect to consider for exposed wood finishes is the aesthetics, as Jennifer Hyer, project designer, RMJM, Princeton, N.J., explains: “The look you’re trying to create is one of the most crucial aspects when specifying different types of wood. Some woods have heavy graining, and some have no graining at all.” It is also important to determine in advance whether you want light or dark coloration in the wood.

It is important to note that even boards of wood cut from the same tree will vary in coloration and character as a result of knots, mineral streaks, and growth rings; the wood’s grain can also vary in direction, size, appearance, and quality.

Figure 1. Janka Scale

Typical American hardwoods	Hardness
Hickory/Pecan	1820
Hard maple/Sugar maple	1450
White oak	1360
Ash (white)	1320
American beech	1300
Red oak (Northern)	1290
Birch	1260
Walnut	1010
Cherry	950
Elm	830
Sycamore	770

The Janka Scale measures the harness of wood. The figure above compares American hardwoods.

Source: Hardwood Manufacturers Association (HMA).

Figure 2. Relative Dimensional Stability of Various Wood Species

Excellent	Above average	Average	Below average
American walnut	African rosewood (bubinga)	African cherry	Australian jarrah
Reclaimed heart pine	African teak (afromosia)	African doussie	Beech
Australian cypress	American cherry	African iroko	Brazilian chestnut (cumaru)
Teak	Ash	African mahogany (sapele)	Hickory
	Santos mahogany	African wenge	
	Tasmanian oak	Australian Sydney blue	
	Yellow pine	Bamboo	
		Birch	
		Brazilian cherry	
		Brazilian walnut (ipe)	
		Canadian maple	
		European maple	
		Peruvian walnut (nogal)	
		Red oak	
		White oak	

Wood species vary in their relative dimensional stability. An experienced supplier can provide advice on how the performance of various wood species in specific applications can be affected by this factor. Source: HMA



A classroom wall panel in the Forest Resources Building at Penn State University features 18 wood species (names have been overprinted to identify the respective woods). The building is also the first large-scale structure supported by maple glulam beams.

In general terms, the tree’s newest wood, called the *sapwood*, is the part that is closest to the bark. It generally comes in a lighter color, is free of markings, and is considered the highest grade lumber. Sapwood is also the most expensive cut. On the other hand, the *heartwood*, the older wood toward the center of the tree, is generally darker, denser, and more character-marked, according to Gil Thurm, executive director of the Hardwood Manufacturers Association (HMA), Pittsburgh.

Another choice is generally referred to as *exotic wood*—very

## Most Popular Hardwood Species

**Gil Thurm, executive director** of the Hardwood Manufacturers Association and a former board member of District of Columbia Building Industry Association, breaks down the popularity of American hardwoods, based on recent surveys by HMA and other industry groups:

Oak (red and white)	52%
Poplar	11%
Maple	8%
Ash	5%
Cherry	4%
Alder	3%
Other species	17%

hard, dense lumber, most often originating in tropical regions. “The relatively new ‘exotics’ do have remarkable resistance to rot and, occasionally, unbelievable strength and durability,” says Dickinson, an architect, lecturer, and author, who has designed more than 500 projects with wood. “But those woods are almost always used in surface capacities—super-decking, flooring, and the like—and are very seldom employed for structural elements.”

Dickinson also points out that salvaged wood and reclaimed wood are also becoming more popular options in light of the growing green building trend. In many cases, salvaged or reclaimed timber offers greater structural predictability than newly cut wood. “That’s because the wood has more or less stabilized in its size and will only swell and shrink given local humidity, as opposed to the drying-out process that inevitably takes a certain percentage of wood’s size away from it for the first year or so after kiln drying, and can subject the wood to twisting and warping,” says Dickinson.

### HOW TO SPECIFY WOOD FINISHES

Once you’ve chosen the suitable wood species for your project, your next decision is to determine which finish will be most suitable to the wood—and to the specific application. Michael Roemen, design solutions manager for 9Wood, Springfield, Ore., a subcontractor that specializes in suspended wood ceilings, says the process of finishing woodwork has two purposes: “First, the finish is used traditionally as a means to enhance or alter the natural beauty of the wood. Second, the finish protects the wood from damage by moisture, contaminants, and handling.”

With regard to Roemen’s first point on the aesthetics of finishing wood, RMJM’s Hyer describes the look lent by different finishes. “*Stains* have the ability to be more transparent—you can see the grain of the wood through the finish—while paints tend to be more opaque. *Varnishes* are typically applied over a stain or paint and give either a very high-gloss finish or a matte finish, depending on the designer’s choice. Wood can also be *open-pore* or *full-filled*, which gives a more finished look,” says Hyer, who has designed interiors for such national retailers as The Body Shop, Saks 5th Avenue, and Bloomingdales.

These aesthetic choices also factor into the level of protection for the wood surfaces, for both indoor and outdoor applications. “Anything that penetrates deeply and leaves less residue on the surface is less efficacious against ultraviolet (UV) and water damage,” says Dickinson. “So exterior oils used as a retardant to decay need to be replenished more frequently to keep their resistance up.”

He cautions, however, that “varnishes and polyurethanes, while initially having a greater resistance and potentially better UV-inhibiting capabilities, are truly a veneer and can have

their efficacy damaged by localized wear and tear, and they always have a greater distortional effect on the overall appearance of the wood.”

Another issue associated with wood finishes that has been given prominence in recent years by the sustainable design movement is the level of volatile organic compounds (VOCs) in the finish formulation. Many Building Teams also remark that end-user preferences and even consumer demand have driven manufacturers to reduce or even eliminate VOC off gassing and any other airborne intrusion resulting from the finish’s curing process. But what about the performance of low- or no-VOC finishes?

“There are those who are leery of low-VOC products and say they are less durable, but it has been my experience that the highest-quality (and most expensive) water-based finishes are perhaps the best on the market today and usually are lower in VOCs than their non-water-based competitors,” says Dickinson.

With regard to floor finishes, Janos Spitzer says, “Waterborne, catalyzed polyurethane floor finish has become ubiquitous throughout the wood flooring industry, owing to its superior performance, ease of use, low VOC emissions, UV shielding, and moderate pricing. Application of other finishes makes up a very small percentage of the projects being undertaken today.”

The Architectural Woodwork Institute recommends solvent-based finishes for on-site applications to casework, millwork, and flooring for better performance and appearance. And while it is important to choose a good-quality finish, be careful not to “overspecify,” as finishes can add to a project’s final cost.

For heavy-duty use, such as certain commercial, institutional, or healthcare settings, expensive acrylic-impregnated floor finishes are recommended, according to the Hardwood Manufacturers Association. These formulations are almost never used in residential settings, although they are common in restaurants and shopping centers. As the name implies,

these finishes impart coloration that penetrates deep into the wood, and they create a hard surface that serves as a durable barrier against dirt, moisture, and wear.

Although wood finishes have their place, some architects, designers, and building owners prefer the look of natural wood. “After 30 years as an architect, I have developed a virtually religious rejection of staining when it comes to wood,” says Dickinson. “I find color-darkening stains inevitably exaggerate and even distort the graining patterns that are present in any wood.” His advice: specify weather-worthy wood without finishing it, as finished wood inevitably needs to be renewed—“and that is often problematic and expensive,” says Dickinson.

### HOW TO SPECIFY WOOD FLOORING

In response to the growing interest in sustainability, more commercial interiors are featuring wood flooring. Using both engineered systems and good old-fashioned carpentry, many Building Teams are using wood floors as the natural place to showcase an attractive surface.

Wood planks come in a wide range of quality, which Spitzer describes in the following analogy: “Wood flooring is not unlike men’s clothing. You can buy off-the-rack, made-to-measure, and custom-tailored clothing. The equivalent in wood flooring is commodity grade, specialty, and custom fabricated.”

- *Commodity wood flooring* is factory generated, in a relatively narrow spectrum of sizes and species.
- *Specialty flooring* is offered by a flooring mill in limited quantities of specific sizes, species, design, and quality.
- *Custom-fabricated wood flooring* is made for a specific project, as per the owner, designer, or architect’s specification.

Overall, solid wood flooring is available in strips—the most common choice—plank flooring boards, and parquet flooring, which comes in 6 x 6-inch patterns.

In terms of popular wood choices, RMJM’s Hyer sees a market preference toward the darker woods, such as walnut,

## 5 ‘Rules’ of Building with Wood

**Author, lecturer, and architect** Duo Dickinson, AIA, principal of his eponymous design firm in Madison, Conn., explains that there are many complexities when dealing with wood.

Even wood from the same log has different properties. Adding engineered wood or reclaimed wood to the mix makes things even more complicated.

To simplify things, Dickinson offers a few tried-and-true rules for building with wood:

**1. Avoid wet materials.** When the temperature is above 50°F, wood that gets wet and stays wet for a very long period of time will destabilize due to rot, swelling, and decay.

**2. Protect against sun.** Exposed surfaces of wood that sit out in the blazing sun for a very long period of time will begin to destabilize.

**3. Don’t attach wood at the end grain.** It’s never a good idea to attach any fas-

tener into the end grain of any wood, says Dickinson.

**4. Specify for strength.** Quarter-sawn wood is always stronger and more stable than flat-sawn wood.

**5. Follow vendor recommendations.** Never deviate from the recommended attachment and installation procedures or assemblies prescribed by engineered-wood companies supplying your building products.



PHOTO: COURTESY NATIONAL WOOD FLOORING ASSOCIATION

This floor, installed by Universal Floors, Washington, D.C., features solid-plank red oak with brass and copper inlays and factory finished with an acrylic impregnated finish. The project won an award for “Best Factory Finished” installation from the NWFA.

ebony, and cherry.

At the same time, Dickinson says there has been a “resurgence” of interest in smaller strip flooring, such as maple and birch. These species are very hard, and if the pieces are small enough, says Dickinson, their expansion and contraction characteristics can be minimized.

Spitzer says that he has observed growing interest in parquet patterns due to their enhanced sustainability and decorative qualities. “Often in commercial spaces, it is desirable to lay wood flooring material directly over concrete, so custom-designed, small-format parquet patterns offer a durable and affordable option that adds visual excitement and style to a space.” Because these floor systems are made up entirely of small pieces that can be manufactured using sustainable materials such as remnant wood, “small-format parquet has the added appeal of being environmentally friendly,” he adds.

Also scoring high on the sustainability chart is bamboo, which can contribute to the U.S. Green Building Council’s LEED criteria for renewable resources. “Bamboo has made

large inroads because it is inexpensive, extremely durable, and visually handles wear-and-tear very well,” says Dickinson. RMJM’s Hyer notes that strand bamboo flooring is twice as hard as traditional parquet flooring species, such as oak.

Regardless of the wood type or flooring board size, wood is considered to be a highly sustainable choice when compared to other building materials. “Unlike certain floor coverings that can breed allergy-generating mold, mildew, and dust mites, wood floors allow no place for such microorganisms because of the material’s density,” notes the Hardwood Manufacturers Association’s Gil Thurm.

In choosing wood flooring, a number of best practices in design and installation should be observed. For renovation projects, RMJM’s Hyer notes that “floating” the wood floor over an existing hard surface can reduce costs. Flooring expert Jacob Spitzer warns, however, that the condition of the new subfloor should be carefully examined. “The best results are achieved with the installation of mechanically fastened solid wood flooring over properly

designed, level-wood subfloor assembly,” he says. He recommends gluing down installations of any kind, including engineered flooring, to reduce the chance of performance failure.

**Decorative wood flooring.** One of the most delightful aspects of wood flooring is the opportunity for dynamic and creative expression. From artistic inlays to distressed floors to the reclaimed wood look, flooring designs can lend style, flair, and character that can distinguish any interior space. Decorative design approaches include:

- *Random patterns.* “In terms of popular decorative flooring, more and more of our clients are asking for larger-board, random-width, random-length flooring for a more kinetic quality, as opposed to the smaller, tighter and more controlled patterns of traditional wood flooring,” says Dickinson.
- *Inlaid designs.* “One popular trend in commercial showrooms, sales floors, lobbies, and reception areas is to inlay a corporate logo into the wood floor using one or more contrasting species of wood,” says Spitzer.
- *Mosaics.* Borders, medallions, and mosaics can be inlaid to create a bold, striking look. Similarly, carved accents can incorporate nature-inspired designs, such as shells or flowers, as relief patterns into the floor.

In a somewhat surprising trend, some building owners are going out of their way to beat up their floors for a vintage, distressed look. The style, which has its roots in the retail industry, seems to be picking up steam in other settings. According to the National Wood Flooring Association, Chesterfield, Mo., distressed floors are now in high demand for their one-of-a-kind, “classic” look.

While the final product for distressed floors may be rich in character, getting there can be labor intensive and time consuming. Common floor-distressing techniques include hand scraping with chisels or grinders, burning the wood, or taking wire brushes, chains, hammers, or saw blades to the floor.

Another approach to achieving an antiqued décor without beating up the floor is reclaimed wood. Because the wood comes from such different sources as old barns, abandoned factories, and deserted Army barracks, each reclaimed board will have a different color, mineral composition, and aesthetic character.

## HOW TO INCORPORATE WOOD INTO CEILINGS

What’s unique about wood finishes for ceilings is that they can be given monolithic treatment. As 9Wood’s Roemen explains, while floors may be covered with rugs and walls may be interrupted by openings such as windows or doorways, ceilings can be as expansive as a canvas. That’s why Mark McInturff, FAIA, principal of McInturff Architects, Bethesda, Md., explains that, from an architectural point of view, “the ceiling is the easiest surface to work with to give a room character.”

McInturff, who has won several American Wood Council

design awards in his 34 years as an architect, often uses wood elements to define or accent space. “Suspended wood panels can anchor the center of the room or define one edge of the room where there is circulation,” he explains. “They can be used to define a path or [suspended] above a conference table to define the way you intend the space to be used. Another strategy is using a wood soffit to string along a route through different spaces in order to tie it all together.”

Creative project designers are dabbling in special treatments, such as moldings, tray ceilings, and coffers. *Moldings* offer architectural punch, by easing the transition from the wall to the ceiling. (Another twist is tucking cove lighting behind the molding to create a gradient of ambient illumination.) *Tray ceilings* follow the roofline at the wall intersection and then angle from the wall to create an effect resembling an inverted tray on the ceiling.

*Coffers*—recessed panels or gridlike ceiling compartments—can be a rather expensive feature. However, they can add greater spatial effect and drama to a room due to the sense of greater height they lend to a ceiling, according to the Hardwood Manufacturers Association.

Another decorative trend that Dickinson has noticed is the use of “strip wood ceilings” to create undulating, arcing, and curvilinear planes utilizing the pieces of wood as facets in an undulating or rhythmically flowing shape.

Dickinson has also found wood to be an effective medium for overcoming the sometimes claustrophobic effect of low ceilings. He cautions, however, that because wood ceilings are “visually very active” and usually darker than their gypsum-board equivalents, they are both “extremely wonderful and potentially tough” to execute well.

**Acoustics.** As ceiling surfaces significantly influence the sound performance of a space, material selection is important. As opposed to metal or plastic surfaces, wood is acoustically warm and organic—one reason acoustic instruments are customarily made from wood, according to 9Wood’s Roemen. And unlike typical acoustical ceiling tiles of cellulose and other absorptive material, wood surfaces are naturally sound reflective, with a noise-reduction coefficient (NRC) of between 0.05 to 0.15.

Wood frames and thin wood veneers are also being incorporated into hung ceiling systems. “Ceiling tiles installed in a suspended metal grid are still the most cost-effective way to create an acoustically functional and aesthetically pleasing ceiling with full accessibility,” says MMMC’s Lander, and now new products are coming on the market to introduce wood panels into this type of system. Hyer points out that removable wood tiles, which offer easy accessibility to the plenum, come in many different sizes, squares, and planks, and give “a lot of flexibility” to the designer.

It is important to be aware of how wood can be applied for



PHOTO: © GROVE CITY COLLEGE. COURTESY HARDWOOD COUNCIL

Pennsylvania's Grove City College Student Activities Center features two-story arched windows and a tall cathedral ceiling framed in heavy wood timbers and reinforced by glulam beams. The center's interior walls on both floors are paneled in Pennsylvania red oak with extensive oak trim, and the main floor is oak parquet, supporting daily foot traffic of more than 400 students. "It feels like it's going to be there forever," says David Lang, AIA, Ballinger Architects ([www.ballinger-ae.com](http://www.ballinger-ae.com)), of the center's Collegiate Gothic style.

different acoustical effects. According to Roemen, different levels of reflection, diffusion, and sound absorption can be achieved via the following approaches:

- **Reflection** – When a bright, lively sound is desired, a flat wooden surface bounces sound back into the room due to its naturally sound reflectiveness.
- **Diffusion** – In order to scatter reflective sound, irregular surfaces such as wood grilles or cubes, or a carved surface like wood wave tile, can be effective.
- **Sound absorption** – When an NRC of 0.65 to 0.90 is desired, openings in the wood ceiling (such as perforations, reveals, or grooves) enable some of the sound to pass through and get absorbed into the ceiling plenum. This approach has been used for many of the thin-veneer ceiling tiles, which use perforations and slits to help control noise.

### HOW TO USE WOOD IN INTERIOR WALLS

The vertical surfaces in building interiors also present an excellent opportunity to boost building performance and kick the architectural effect up a notch. According to Tom

Gray, AIA, with DRS Architects, Pittsburgh, "Special wall and ceiling treatments are critical in the overall success of an interior space, especially for commercial projects. Detailing a room with a mix of paneling, wainscoting, chair rails, crown moldings, corbels, or beams provides an opportunity to create pattern, texture, scale, and personality."

In nonresidential buildings, says Duo Dickinson, "There is often a lower expectation of craft, and so whenever craft is present—such as expressive wainscoting or chair rails—it becomes a feature." Wall rails and durable wainscoting offer practical benefits as well, such as protecting walls in high-traffic areas against premature wear.

Using wood on interior walls is "another creative way to add accent color to a space," adds Hyer. "You can raise the wainscoting to 46 inches instead of 36 inches, which is the typical chair rail height, and it creates a different look and plays with the scale of a space." Hyer says she often uses wall paneling to add visual interest to the design and help with the occupant's perception of scale. "It's also an easy way to add color and texture to a space, as well as address acoustic

issues,” she says.

Overall, interior wood walls are commonly used in executive offices and boardrooms, as well as in healthcare settings, to help play down the institutional feel, says DRS Architects’ Lander. At the same time, McInturff points out that wood wall treatment should be used selectively, as it does cost more than drywall and other common partition types.

### HOW TO DESIGN WOOD WINDOW TREATMENTS

Breaking away from the aluminum and plastic blinds that used to dominate the market, wood and faux-wood blinds and shutters are now enjoying unprecedented popularity. Judith Persit, a Palm City, Fla.-based author and expert in blinds and shutters, says wooden blinds are an important new trend in interior decorating. Duo Dickinson agrees, stating that many architects and interior designers are turning away from “the plastic and sheet-metal imitations that came to dominate the market in mid-twentieth-century America.”

Shutters and blinds have two purposes: 1) to control lighting and solar heat gain and 2) to improve building aesthetics. As for the latter, McInturff uses such slatted surfaces to visually break up spaces, play with light, and create an evocative effect. However, Persit points out that there is a cost differential between blinds and shutters, especially with the introduction of shutter blinds, which utilize a wider slat and thus project a shutter-like appearance.

The variety of styles and fine finishes available in wood window treatments has grown dramatically, according to the Hardwood Manufacturers Association. Moreover, growing interest in wood flooring designs has encouraged greater use of wood blinds and shutters.

Wood blinds are the less expensive option, and often utilize large slats of typically southern or tropical woods to provide effective light control and visual enhancement to interior spaces. Wood shutters have improved in recent years, says Dickinson. “There are more companies making them than there have been in the last 20 years, and there seems to be a greater level of care taken in how they are produced,” he says.

### HOW TO USE EXPOSED EXTERIOR WOOD

When it comes to exterior wood finishes, exposed wood cladding, trim, railing, and decks can lend great visual interest to many facilities. They can also present a serious challenge for fully maintaining material and system integrity in the face of harsh weather and climatic elements.

In fact, architect McInturff sees exterior finishes as the “weak link” when it comes to designing a truly sustainable exterior using exposed wood. First, he says, it is difficult to preserve the wood’s original color. Second, most finishes require quite a bit of maintenance, even though he acknowledges seeing progress being made on this front by finishing



Lewis & Clark State Office Building, Springfield, Mo., features paneling of regionally harvested ash red & white oak flooring, ash doors and trim. Designed by the Houston office of BNIM Architects, the building houses Missouri’s Department of Natural Resources.

product manufacturers.

One of the areas of technological advance is in UV-inhibiting coatings, based upon the growing awareness that UV rays are visually and functionally damaging to exterior wood finishes. This is also in tune with green building trends, says Dickinson. “There has been an enormous push in the last decade to create effective wood finishes that will not have the potential negative impact on the environment when disposed of or when leaching into the ground,” he says.

In terms of selecting wood species to best stand up to the elements, experts recommend reclaimed and recycled old-growth products (where available), which provide a high degree of stability and a tight grain. Premium woods, such as redwood, cedar, or cypress, are common choices based on their dimensional stability and natural resistance to fungi and termites. However, Jeff Linville, director of technical services for the American Institute of Timber Construction, Englewood, Colo., points out that one thing to keep in mind when specifying naturally durable wood for decay/termite resistance is that only the heartwood of the species is resistant to attack. He advises that “it is not sufficient to specify red-



PHOTO: COURTESY NATIONAL WOOD FLOORING ASSOCIATION



This winery floor, installed by Fontenay, Corona Del Mar, Calif., features solid reclaimed French and American white oak plank, and is hand-made from old wine barrels.

wood for an outdoor deck—you must also specify that it be heartwood.”

Linville, whose organization represents the glued laminated timber industry, further distinguishes between exposure to air and exposure to water. “Wood exposed to outside air but protected from precipitation does not require pressure treatment or the use of naturally durable wood. The humidity in the air is generally insufficient to raise the moisture content of the wood above the decay threshold,” he explains. He goes on to advise that wood that will be exposed to weather should be pressure-treated, unless you’re using a naturally durable species.

Linville further explains that using a simple topical treatment will not always protect exterior wood. The method of protection must be determined early in the design process and not as an afterthought, he cautions.

### DEFINING CERTIFIED WOOD

Another important consideration in today’s market is deciding whether to build with certified wood products. More and more, Building Teams say yes, and not just to get higher scores on green rating systems like LEED or Green Globes. “By demanding that the wood be certified sustainable, you pressure suppliers to reduce destructive forestry practices,” says DRS Architects’ Gray.

Fortunately, there are a number of programs utilizing

third-party certification, such as the American Forest and Paper Association’s Sustainable Forestry Initiative (SFI) and the certification program of the Forest Stewardship Council (FSC). Through SFI or FSC, building professionals and end-users can be assured that their facility’s wood was harvested according to sustainable methods in forests managed by strict environmental and social standards. “The forest operation must conserve biological diversity, water resources, soil, ecosystems, and landscape to maintain the ecological function of the forest and high conservation value,” says RMJM’s Hyer.

Of course, certified wood has an important role to play when seeking many kinds of registrations and ratings. For example, says Hyer, “A building can receive a LEED credit if a minimum of 50% of wood-based materials and products comes from a certified group,” explains Hyer. But even though certified wood is becoming more and more critical to architects

## Wood Enters the Tiny Realm of Nanotechnology

**Will wood someday be a force in the world** of nanotechnology—the science of enhancing the properties and performance of materials and products by manipulating them at the nanometer scale, or one billionth of a meter?

The U.S. forest products industry thinks it can. It has developed a nanotechnology roadmap to identify needs and opportunities to improve the performance and functionality of wood products.

As delineated in “Nanotechnology Opportunities in Residential and Non-Residential Construction,” a report by the Forest Products Laboratory, a division of the U.S. Department of Agriculture Forest Service, the forest products industry seeks to utilize two main strategies:

- Incorporating nanomaterials and nanosensors developed by other industry sectors into construction wood products.
- Exploiting the nanoscale properties of wood to develop completely new products.

For example, by using “nanomanipulated fiber-to-fiber bonding,” wood could be made to offer longer service life in severe moisture environments. By incorporating nanosensors into wood products, new “intelligent” wood could be capable of measuring variables such as forces, loads, moisture levels, temperature, pressure, and chemical emissions. Nanosensored wood might even be able to detect fungi and termites.

Other potential applications for tomorrow’s “nano-woods” include materials with enhanced capabilities for fire protection, weathering resistance, UV protection, and preservation of exterior finishes.



and builders, professionals like McInturff contend there is still a long way to go, as only 10% of the world's forestland is certified, according to the Sustainable Forestry Initiative.

"It is important to hold manufacturers and distributors accountable to a real chain of custody," says Gray. "Chain of custody" refers to the chronological documentation that proves where a product originated and how it reached the job site. "The more demand they see for this certification, the stronger the control over forestry practices will be," adds Gray, who frequently specifies wood, most commonly for commercial buildings seeking LEED certification.

### APPRECIATING THE BEAUTY OF WOOD

Even though there are many choices when it comes to building materials, there is still something special about wood. "Wood talks back," says McInturff. "When you look at it, it gives something back. The color, the grain—there is something living about it. It's a very easy way to bring warmth into a space."

Flooring specialist Jacob Spitzer speaks for many suppliers, contractors, and other experts when he concludes, "The natural beauty and warmth of solid wood, coupled with its longevity and resilience, make it an excellent choice for a wide variety of nonresidential applications." BD+C