COMMERCIAL WOOD FLOORING

by James Bodnar

Commercial establishments use wood flooring to achieve a warm, non-commercial look. In this hair salon, the architects specified oak strip flooring.

Specifying wood for high-traffic floors requires knowledge of tree types, finishes, and special treatments

Over the centuries wood has been one of the most abundant flooring products, from the intricate, artistic parquet floors of Europe, to the hand-cut floor planks of early American homes.

Until the introduction of synthetic floors, wood, stone, marble, and hand-knotted wool rugs were primarily underfoot. In 1863 Frederick Walton invented linoleum, the first synthetic floorcovering. By the 1940s — and especially after the Second World War— building booms in America found wood floors being bypassed in favor of synthetics. Tough-wearing, cheaply produced nylon carpet went in quickly with the new tackless method of installation. Carpet flowed into commercial interiors and is still going strong. Today, linoleum has been almost entirely replaced by less expensive sheet vinyls. But wood flooring still has a place in modern construction.

For the specifier or designer of wood flooring or walls, a specification may seem fairly simple: oak is oak and maple is maple. Species of wood, being made by nature's own manufacturing process, do not basically change. Individual grades pertain to appearance only and do not affect performance. It is in areas of design and layout, treatment, handling, and installation where the specifier and end-user must be most careful. Using wood as an interior product demands insight into its special features.

Types of Wood Flooring

Two main methods are used in the cutting of woods for flooring. A quarter-sawn cut is made at right angles to the annual layers of wood, parallel to the rays. Plain-sawn cuts are made approximately at right angles to the rays, or cut perpendicular. A quarter-sawn piece appears as wood with parallel vertical lines. Growth rings in the plain-sawn piece appear as inverted V's.

Three types of wood flooring are recognized by shape and size. Strip flooring, constructed with tongue-and-groove edges, is the most common. Widths of strip flooring are usually 1½ to 3 inches wide. Oak and maple are the predominate stripwoods.

Plank flooring is wider, from 3 to 8 inches, and used most often for rustic appearance in residential and light-commercial areas. Plank usually has pronounced texture, which takes to dyes and stains easily. Both plank and stripwood are available in laminated form.

Block types of wood flooring have many shapes: parquet, wood mosaic, tile types, and brick shapes. Parquets are composed of strips of wood which are, in turn, quarter-sawn and plain-sawn. Giving greater strength, quarter-sawn pieces should be prevalent in commercial parquet tile.

Sizes of parquet can vary greatly, some requiring special skill in application. Edges can be straight butt-edge (this type requires absolutely level subflooring if tile is prefinished), beveled-edged, or tongue and groove. Grades of wood within the tile may be mixed, pieces reversed for design modifications, and wider or narrower strips can be used as borders. Metal inlays can also be used. Parquet can be laminated or have attached foam backings. The herringbone, or brick type, is a variation usually 3 inches by 9 inches in size.

End-grain block flooring is cut from stripwood. The blocks lay side by side in bituminous mastic. They are from 1½ to 4 inches thick, and 2¾ inches wide. Hot coal-tar pitch is spread on the block floor as a preservative and binding agent, working into the joints. Foot traffic will wear off the surface layer of pitch. Some of the common woods used for this type of block flooring are Southern yellow pine, fir, and oak.

Woods Commonly Used

Woods most in use and attainable for flooring are oak (accounting for 95 percent of all wood floors), maple, beech, birch, pecan, cherry, ash, and walnut. Some common softwoods are fir and pine (there are 35 pines native to North America). Exotic woods such as teak, ebony, and mahogany may be prohibitive in cost for many commercial installations.

Red and white oak have four grades, as standardized by the National Oak Flooring Manufacturers' Association. Clear, or prime grade, is the top selection, generally free of defects such as knots and heavy grain. Select is almost clear, but showing some knots and imperfections of grain. Common 1 and Common 2, which show more grain and natural characteristics, can be dyed or stained to more pronounced grain patterns. Grades have nothing to do with performance and are only used for comparative visual differences. Commercial grades may be referred to as common, third, and tavern. Furniture manufacturers grade wood species similarly.

Grains of wood may be referred to as fine, or close-grained: maple and birch are two examples that have small, packed cells. Coarse-grained or open-grained wood have large, more porous cells. Some of these are oak, walnut, and mahogany. Open-grained woods require wood fillers. If wood cells and fibers run parallel to the tree's trunk, they are known as straight-grained. Cross-grained fibers run crooked and are slanted or twisted. Other grains are termed as spiral, wavy, and interlocked.

Types of Finishes

Being familiar with types of finishes will help the specifier obtain a specific appearance. Penetrating sealers soak into wood and harden, helping the floor to resist dirt and stains. There are slow-drying sealers, which most maintenance personnel can apply, and fast-drying sealers, which should be applied only by professional refinishers.

Surface finishes are applied with brushes or a lamb's wool applicator, and should be used only when the floor is completely sanded of old finishes.

Polyurethane finishes are the most applicable to commercial areas because of superior abrasion resistance. Polyurethane is made from synthetic resins, plasticizers, and film-forming agents. There are two types of polyurethane finishes: oil-modified, air-drying, which can be applied by the average maintenance person; and moisture-cured, which should be applied by a professional. The moisture-cured finish is more wear-resistant, but is sensitive to humidity and has a critical drying time. Not all polyurethanes are compatible, so it is important to know if old floor finishes exist below the sanded surface.

Polyurethane finishes are touted as never needing wax. Most professional maintenance firms believe, however, that wax helps wood wear better and maintain its appearance. Some floors, such as gymnasium and roller rink, should not be waxed. Special products are used to provide slip and abrasion resistance.

Similar to polyurethanes are epoxy and urea-formaldehyde finishes—synthetics creating tough-wearing surfaces. They too require professional application because of working time and number of coats.

Varnish and shellac have been used for years as floor finishes, but varnish has been almost replaced by synthetic products with better wearing properties. Shellac has a low friction point and weak resistance to abrasion, and also reveals liquid spills more easily than other finishes. Lacquer creates a glossy finish and is fast drying, but is difficult to apply and shows lap marks and scuff marks easily.

Treating Wood

The most advanced treatment of wood incorporates an acrylic plastic (methyl methacrylate monomer) forced into the cellular structure in a pressure-vacuum procedure. After being impregnated from surface to back, the wood is exposed to gamma irradiation, which converts the monomer into a tough polymer, resulting in a hardened product resistant to abrasion and moisture. Fire-retardant chemicals, or dyes with locked-in color, can also be added in the process. Wood treated this way has a lower flame and smoke spread than most commercial carpet.

Because of its hygienic properties and fire retardant treatments, irradiated wood is a good selection for health care institutions and hospitals, and is the easiest wood to maintain.

All shapes of wood can be irradiated. Standards of producing this type of product must fall under those accepted by the American Parquet Association and the National Bureau of Standards if in tile form. Oak, ash, maple, and walnut are the woods common to the acrylic/radiation process.

Hardwoods are tested for strength as relating to resistance, bending, crushing, elasticity, loads, and indentation. Hardness of wood governs its machinability during manufacturing or its workability at the job site, and also relates to abrasion resistance. Other tests conducted on wood are for thermal conduction, water vapor transmission, smoke density, fuel contribution, and flame spread.

Noise

Areas of high abrasion or concentrated foot traffic, and areas where sound is a critical factor should be carefully planned. In today's modern office system of open spaces, sound is easily transmitted. An overuse or misplacement of wood floors or wood walls may be detrimental to working comfort because of the increased noise level. If possible, keep wood away from the sources of noise, such as appliances in restaurants, or around noisier office machinery and air conditioning units. Some parquet tiles are available laminated to foam backing to lessen sound transmission.

Sources of sound should be considered in institutional and multi-family buildings where people and activities are more condensed. Many luxury condominiums are using hardwood floors in living areas; placement of other units such as bathrooms and kitchens (with hard-surface floorcovering) may require sound deadening material between floors. Suggestions for installing such material is covered in the National Oak Floor Manufacturers' Association's *Hardwood Flooring Installation Manual.*

Moisture

All wood flooring intended for interior use should be kiln-dried. (Kiln-dried does not indicate amount of moisture, but moisture content of wood should not be much lower than that of actual installation area.) This method of drying wood allows it to take stains and finishes better. Kiln-dried oak is manufactured at a 6 to 9 percent moisture content, with slight allowances.

Few points, from specifications of material to final installation and finishing, can be stressed more than the proper handling of wood. Moisture is its greatest enemy, from the manufacturing facility, while in transport, and on the job site. Moisture from drying plastered walls or masonry work must be safely dissipated before flooring is laid or even stored at the job site. (A curing slab of 4-inch concrete can release 1 ton of water per 1000 square feet.)

Areas must be well ventilated and temperature and humidity regulated before, during, and after installation. Never handle wood on rainy days, in snow, or on days of high humidity. Scheduling must be realistic and wood guarded from moisture and cold and stored for a few days on the job site to acclimatize. The National Oak Flooring Manufacturers' Association offers literature with guidelines for control of oak flooring under various conditions of temperature and humidity. These steps can be used for all wood flooring.

Cracking is a serious condition resulting from effects of moisture. If newly installed flooring is not sealed in time, it may absorb moisture from surrounding air. As the wood swells, its compression set will change and crushing will occur.

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When air around the wood changes to a higher temperature and lower humidity, the wood releases moisture as it dries. Boards start to shrink and cracks form between them. Once begun, the boards never fully recover to their original placement. This condition can also occur in refinishing jobs when surface finishes are sanded off and moisture and temperature of surrounding air are not controlled before application of new finishes.

Tests for moisture should be made in areas throughout the proposed installation site. In no case should a flooring contractor proceed until all conditions are satisfactory, other workers have completed their jobs, and all conditions guaranteeing a good installation of wood are met.

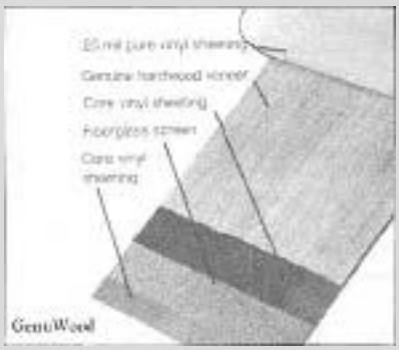
Installing wood below ground level is not recommended because of capillary action of water caused by pressure from the surrounding ground. On-grade installations require protection of the slab with a vapor barrier below and on the slab. Adequate ventilation is needed below the slab if no basement exists. Plywood is preferred over particle board, which is more dimensionally unstable. (Resins in particle boards are highly affected by moisture.)

Over wood joist construction, boards should be nailed diagonally to the joist and be straight and thoroughly dried. A layer of building paper is laid over the boards before placement of finished flooring. If subfloor boards are not used, at least ½-inch plywood is required, nailed directly to the joist. If parquet tiles are used, an extra layer of ¼-inch plywood is needed over boards or plywood for greater strength. Most parquet floors are laid into an asphalt mastic, so they do not require a nailing surface concrete slabs, but do need a moisture barrier. Follow nailing pro-

Wood With A Difference

Natural wood floors may be popular in commercial interiors, but they still have to stand up to high traffic and rugged use. Several manufacturers of wood flooring have introduced products that use modern technology to make wood more durable — and thus more practical for the commercial setting. Here are a few options to consider:

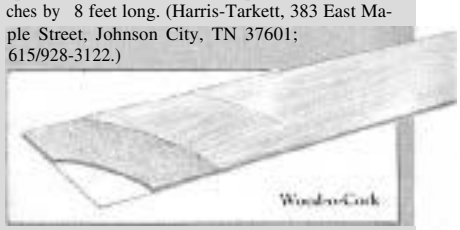
Vinyl-impregnated wood. Permagrain is "finished all the way through," according to Ron Daniels, the company's New England rep. Liquid acrylic the consistency of water is pumped into the air spaces naturally found in wood. In some cases, the acrylic is dyed, changing the color of the wood. After the wood/vinyl combination is hardened, the top of the flooring is sanded. No additional finishing is necessary. Comes in tiles, planks, and tongue-and-groove edge scrips, in a variety of colors, and has a 20-year wear warranty. (Permagrain Products, 13 West Third Street, Media, PA 19063; 800/548-5000, 800/892-3226 in Pa., and 617/879-3226 for New England Rep.)



Vinyl-bonded wood. Another product from Permagrain Products (for contact, see above), GenuWood II is genuine wood, sandwiched between two layers of vinyl. It installs like vinyl, but the company promises that it will last four to five rimes longer than an ordinary vinyl floor. Because it is water-resistant, it's specified for kitchens, restaurants, lobbies, and other places where liquid spills are likely to occur. Comes in several patterns, including random plank, herringbone, basketweave, octagon, and others, and lots of colors.

Foam expansion joints. Wood-Flex, a red-oak hardwood flooring system features built-in foam expansion joints to absorb the expansion and contraction of each row of slats, minimizing cupping and buckling due to humidity. Individual slats are joined, forming panels up to 12x75 inches. Sport-Flex uses the same foam expansion joint system as Wood-Flex, but is made of hardwood maple instead of oak. It's designed for basketball courts and other recreational uses. (Horner Flooring Company, Dollar Bay, MI 49922; 906/482-1180.)

Floating on Foam. Long Strip is hardwood planking, tongue and grooved on ends and sides, end matched, and prefinished with four coats of factory-applied acrylic polyurethane. Its manufacturer recommends that the flooring be "floated" (not attached) on a subfloor covered with Volara foam underlayment supplied by the company. Several species are available. Standard planks are 3x3/8 inches by 8 feet long. (Harris-Tarkett, 383 East Maple Street, Johnson City, TN 37601; 615/928-3122.)



Cork and Vinyl Sandwich. Like Genuwood mentioned above, Wood-o-Cork is sandwiched between two layers of vinyl to provide durability. In addition, there is a layer of cork directly beneath the wood to provide comfort. The company claims that the cork improves the strength of the product, provides physical comfort to those who walk on it, lowers sound impact, and insulates from the cold. The product comes with a ten-year limited wear warranty, and comes in planks sized 900x150x3.2mm. One consideration: the product brochure mentions the tendency for vinyl surfaces to develop static in low-humidity conditions. Although a remedy is presented (washing the floor with non-foaming detergent) this may be a concern in offices containing equipment where static electricity could be a problem. (Wicanders, Expanko Cork Co., P.O. Box 384, Westchester, PA 19380; 215/436-8300: 617/395-9000 for New England Rep.)

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cedures carefully where needed.

Sports Floors

With a growing interest in physical fitness, many sports surfaces are being made of wood. Most are ¾-inch pecan or maple. Maple is tough, resilient, and long-lasting—the most popular sports surface.

Most sports surfaces are installed over suspended systems, which absorb stress while remaining strong. If wood is installed into mastic directly on a concrete slab, the adhesive must be flexible to within accepted tolerances. When installing over suspended slabs and slabs in direct contact with the ground, hot or cold mastics can be used.

In a sleeper system a vapor barrier is laid on the slab, sleepers (usually 2x3s on 12-inch centers) are laid over rubber pads for greater cushioning. A layer of plywood is then nailed to the sleepers and the finished strip-wood flooring nailed to the plywood. Sleepers can be eliminated, with a double layer of plywood laid on cushioning pads and final flooring nailed in place. Some systems use metal locking clips set into metal channels. The clips hold the wood pieces individually and securely, requiring no nailing. As a total installation, a floor secured by metal clips minimizes the natural expansion of wood under heavy use.

As with other types of installations, moisture must be controlled by asphalt felt, building paper, or polyethylene film.

Selection of installation methods varies depending on budget, nature of use, and subfloor conditions. Choosing the wrong installation method sacrifices performance.

Wood on Walls

Wood on walls works well with all types of floorcoverings, and offers a pleasant break in color and texture. Strip flooring, because of its linear look, makes some of the better designs and patterns—it can be installed horizontally, vertically, or diagonally.

Plastered walls should be sufficiently dry, with surrounding masonry presenting no moisture problems. A vapor barrier should be installed on the inner face of the studs or on masonry walls. For horizontal layouts the wood can be nailed directly to the studs. Furring strips nailed to the studs can be used as the nailing surface for stripwoods used vertically or on a diagonal.

Remember that more stringent fire ratings apply to wall finishes. A flame-resistant coating or other treatment may be applied to obtain a Class 1 (25 flame spreading) rating.

Few interior finishes can rival the warmth, durability, easy maintenance, and prestige of wood. Once all criteria of function and design are considered and flooring and wall conditions known, the specifier or designer can do little wrong in selecting wood. As for cost, though initially high, the expense of wood becomes lowered by its useful lifetime. During that time it maintains its natural beauty as few floorcoverings can. ■

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