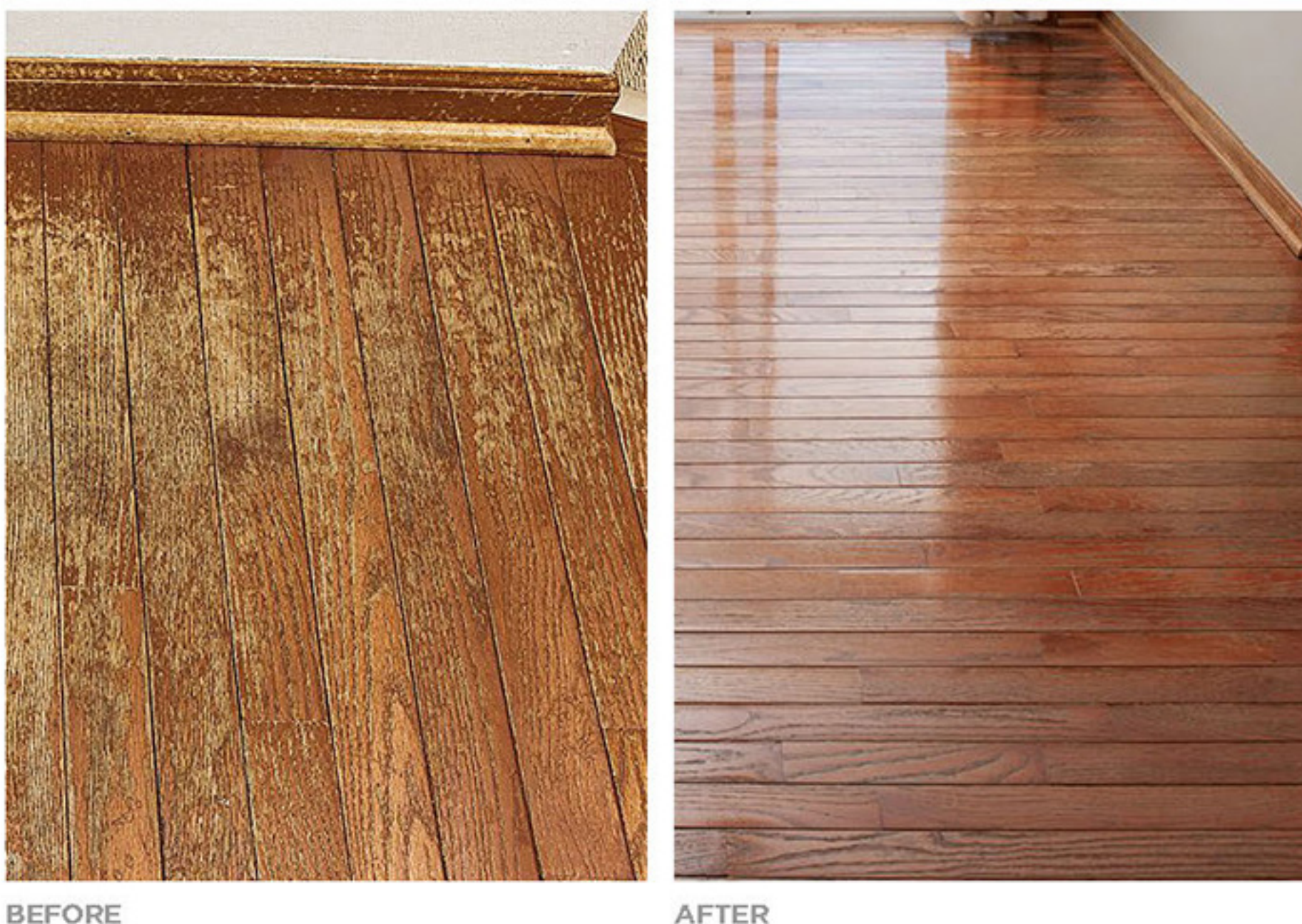


Technical Considerations Concerning Hardwood Floor Cleaning and Restoration in Residential Settings

Consumer demand for hardwood flooring has grown dramatically over the past decade. What do cleaning contractors need to know before deciding whether to expand their service to include hardwood floors?

>> by Roy Reichow



According to Catalina Research's Quarterly Updates, the value of hardwood flooring sales has steadily increased despite a slowed economy.

Three consecutive years have shown increases:

- 15.8% gain in 2010
- 4.4% increase in 2011
- 4.3% additional gains in 2012

As the demand for wood flooring has increased, so have advances in factory-finished and site-finished wood flooring. Oftentimes these floors are installed by hardwood subcontractors, and cleaning or maintenance information/services are not offered to the buyer. If the floor is sold through the general contractor, sometimes a "Home Care

Guide" will be provided, but often it will not list the floor covering manufacturer or installation company.

Often with no knowledge of the flooring manufacturer or proper maintenance instructions, the new hardwood floor owner will search the Internet or shop at local grocery or hardware stores for cleaning solutions. This is where the problems begin. The floor owner will experiment with a number of different products and when they fail will seek the help of a professional. The purpose of this article is to provide an overview of the things floor care professionals need to understand about wood flooring before offering this service.

Types of Wood Flooring

First, it is important that wood floor maintenance professionals understand the diversity of products they will be asked to maintain. There are two primary categories of wood flooring: solid and engineered.

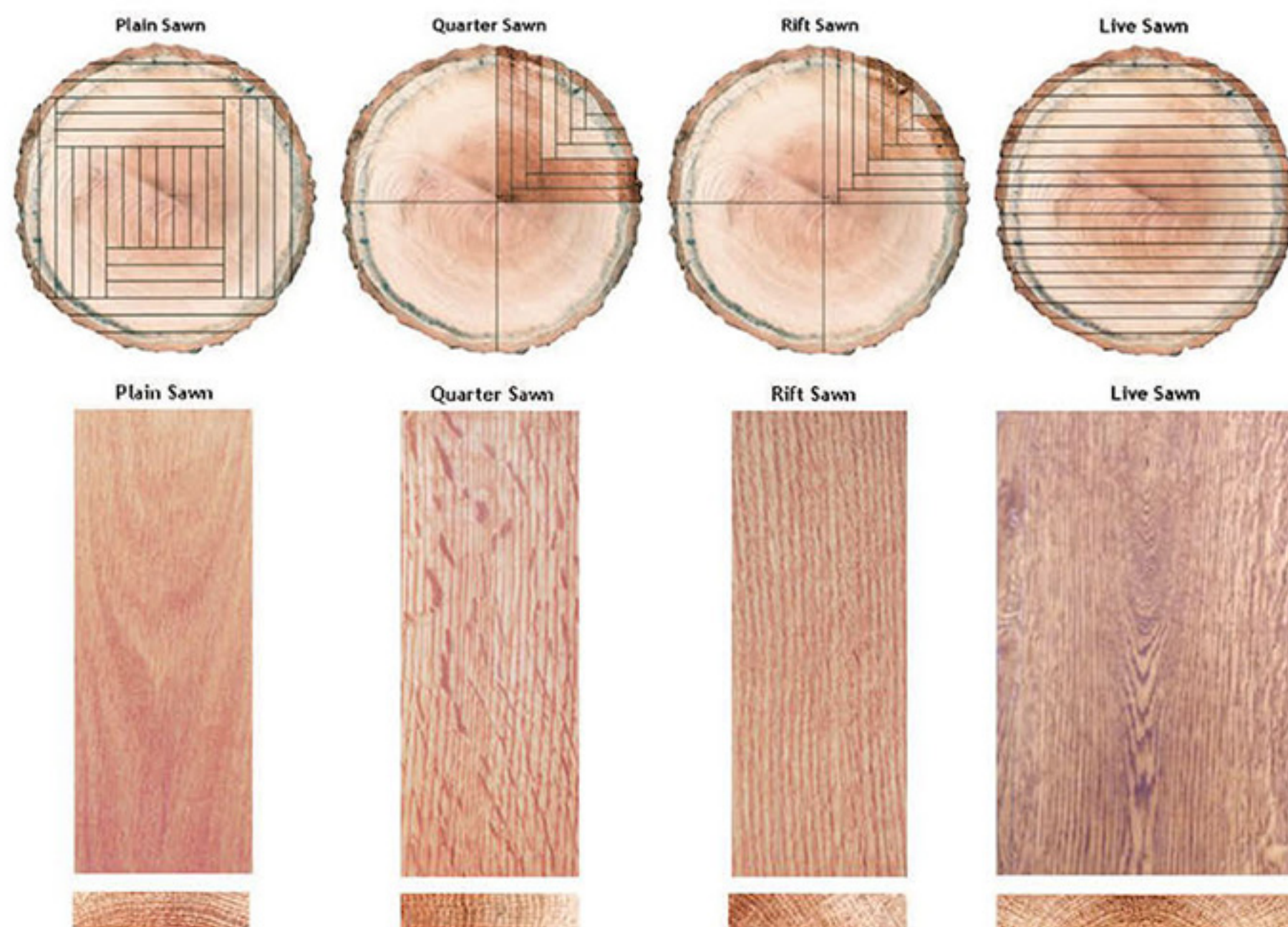
- **Solid wood** is typically dried to six to nine percent moisture content and milled into one piece varying in thickness from 5/16 to 1 inch thick and widths from 1-1/2 to 12 inches. Typically this type of floor is tongue-and-groove style for blind nailing installations. In recent years, direct-glue installations over concrete have become successful with new adhesive technology.
- **Engineered wood** is composed of two or more layers to create a plank. The top layer, the lamella (sometimes called the veneer), is classified as the "wear layer" and is the wood that is visible when the flooring is installed.

The layer(s) beneath the lamella are classified as the core, which can be made from multi-ply construction of varying species of wood or composite wood such as high-density fiberboard (HDF). During the manufacturing process, the lamella wear layer is adhered to the core. Stability is increased by running each layer at a 90° angle to the adjacent layer. Engineered wood flooring provides more stability than solid wood flooring and can be installed over all types of subfloors, on, above or below grade. To identify engineered flooring, look at the edges and ends of the board for lamella.

Grain Types

Generally, grain types are achieved by sawing lumber in one of four ways: plain sawn (sometimes called flat sawn), quarter sawn, rift sawn and live sawn. (see Figure 1) Each of the following can be used to make either solid- or engineered-wood flooring.

FIGURE 1



- **Plain sawn**, also called **flat sawn**, is simple and the most cost-effective way to produce planks for flooring. This process is completed by making a series of parallel cuts through the log and pro-

vides the least amount of waste. Plain sawn material has a greater potential for cupping, twisting or bowing due to directional tension across the grain. When plain-sawn flooring absorbs moisture from the atmosphere, plumbing leaks or maintenance, it will become distorted. The appearance of plain sawn has wide growth rings on the face of the plank creating large, open-grain (sometimes called “cathedral”) patterns. Some people describe this type of cut as having a “tiger stripe” appearance across the face of the flooring.

- **Quarter sawn** is far more stable than plain sawn. It is less susceptible to the distortion that comes with expansion and contraction from absorbing and releasing moisture. Quarter sawn flooring is often recommended for areas with moisture concerns, such as commercial environments or homes with damp basements or crawlspaces. To create quarter sawn lumber, the log is first cut radically into four quarters (wedges).

Each quarter is then cut separately by tipping it up on its point and sawing boards successively along the axis. The result is the annual rings are perpendicular to the face. This produces floor-

ing with straight grain appearance and distinctive ray-and-fleck figure.

- **Rift sawn** is the most stable flooring and also the most wasteful to produce. Each floor board has a perpendicular grain to the surface of the board. The appearance is similar to quarter sawn except without the flecks or rays. In his publication *Understanding Wood* Bruce Hoadley states the rule of thumb that lumber is cut 45° to 90° from the surface; “pure rift” is 90°.
- **Live sawn** has been used by European countries for years as a standard method of production. The log is sawn through the heart. The United States has recently adapted this procedure and it is now being offered by some flooring manufacturers. Live-sawing produces a high percentage of quarter-sawn boards, and boards with heartwood centers and sapwood edges.

In addition to the above-mentioned grain types and processes, which are found in both solid- and engineered-wood flooring, following are three types exclusive to engineered:

- **Rotary peeled** is a type of engineered wood floor that involves boiling the log in water. Next the log is peeled using a knife blade starting from the outside of the log and working toward the center, creating the lamella. The lamella is then pressed flat and glued to the core material with high pressure. The rotary-peeled lamella has micro lathe checks on the bottom side. These lathe checks are glued face down to the core material. When these floors go through normal climatic changes, sometimes the micro checks will telegraph to the surface and can be seen by the naked eye. Rotary-peeled engineered hardwoods tend to have a wide-grain appearance.
- **Sliced** begins with the same treatment process as rotary peeled except instead of peeling it is sliced. The wood is sliced along the length of the log creating lamellas. These lamellas go through the same manufacturing process as rotary-peeled lamellas and tend to have fewer problems with “face checking.” This

FIGURE 2



Telescoping lathe checks on rotary-peeled lamella

type of process provides the same type of appearance as dry sawn material.

- **Dry sawn** hardwood logs do not go through the boiling process. Instead the logs are sawn in the same manner as for solid hardwood flooring, only thinner. This style of engineered hardwood has the same look as solid hardwood flooring.

Installation Methods

- **Tongue and Groove** systems are manufactured with one side and one end of the plank with a groove, the other side and end a tongue. The tongue fits into the groove, aligning the planks, and the tongue is not visible once joined. This system can be installed by nail-down or glue-down for both engineered- and solid-wood flooring. Nail-down systems are nailed on the tongue at a 45° angle and the adjoining piece (groove) will hide the nail. This is called blind nailing.
- **Floating** floor systems, whether a click or edge-glued system, are classified as “connected units.” This simply means all the individual pieces are connected together making the flooring surface one unit. There are a number of patented “click” systems on the market which are similar to tongue-and-groove, but have a curved or barbed tongue fit into a

modified groove. The edge-glue system has glue applied to the groove edge of the plank and inserted into the tongue of the adjoining plank. Either system is floated over a sound isolation pad to reduce sound transmission along with a vapor barrier to minimize vapor emissions from substrates. These systems exist not only for engineered-wood floors but also engineered bamboo and cork. Seasonal changes will cause this floor type to expand or contract. For example, a 30’ x 30’ room will expand/contract up to 3/4”. The installer must allow for this normal expansion space as dictated by the manufacturer. However, if this floor experiences elevated moisture content due to a surplus of cleaning solutions, it may expand beyond its projected requirements and buckle or tent.

- **Glue Down** systems are a popular method for solid parquet flooring as well as all engineered flooring types. Solid wood floors can also be glued down but with certain limitations. Adhesive is troweled onto the underlayment, substrate or subfloor using a similar method to that used to install ceramic tile. The wood pieces are then laid on top of the adhesive and tapped into place using a rubber mallet and a protected tapping block.

Floor Finishes

The most common modern finishes for wood flooring are solvent-based and water-based polyurethane, although there has been a resurgence of oil/wax and varnish systems primarily in prefinished wood flooring products.

- **Polyurethane:** This clear-type hard-surface finish is the most commonly used to protect hardwood flooring. Polyurethane comes in two basic types: solvent-based and water-based. Within the polyurethane category are found several subtypes, including oil-modified urethane (OMU), UV cured, moisture cured, acid cured, and aluminum oxide.
- **Shellacs and varnishes:** These were commonly used at the turn of the twentieth century and top dressed with wax. Shellac is a widely used single-component resin varnish that is alcohol-soluble. Most resin or “gum” varnishes consist of a natural, plant-derived or insect-derived substance dissolved in a solvent which may be alcohol, turpentine, or petroleum-based.
- **Hardened oils and/or waxes:** Oiled floors have existed for hundreds of years and are made from naturally derived drying oils, which should not to be confused with petroleum-based oils. The new hardened oil/wax hybrids are vegetable-based or blended oils. They are 100% natural and contain no Volatile Organic Compounds (VOCs).

Prefinished and Site-finished Flooring

- **Prefinished flooring** has the finish applied to it at the factory. It is available in a wide variety of finishes. When flooring is finished at the factory, there can be milling inconsistencies. To avoid sharp edges and overwood/lippage, all prefinished boards are beveled on the sides and some on the ends. This creates “micro-grooves” between boards.
- **Site-finished flooring** is a floor that is sanded, stained and finished after it is installed. The result is a smooth surface with no detectable high or low points between the boards, therefore there are

no grooves as with prefinished floors. Some site-finished floors have beveled edges and ends, primarily in wider-plank floors. However, typically the floors have square edges and ends.

Floor Finish Identification and Maintenance Procedures

When developing the scope of this article, initially the plan was to include recommended maintenance procedures for each type of finish. As the article was developed, it became apparent that the variables involved in maintaining floors finished using shellacs and varnishes, as well as those finished using hardened oils and/or waxes, were so complex as to be beyond the scope of a single article. Consequently, this article will focus on finish identification and then on cleaning, maintenance and restoration procedures for polyurethane-finished floors only.

Project preinspection: The first step is to preinspect the project; this is vital. By identifying the type of floor and finish and, where possible, the floor and/or finish manufacturer, you will be able to put together a plan with a high probability of success both in terms of project results and customer satisfaction.

Many flooring and finish manufacturers have specific maintenance guidelines that must be complied with precisely to honor the floor/finish warranty. Any variations to their floor care instructions must be cleared through technical support (in writing, if possible). Ask the floor owner for information about who the floor and/or finish manufacturer is. If the owner is unable to provide you with this information, it is recommended that you obtain a release from liability for failing to follow the manufacturer's specific floor care instructions. (Note: This is not a shield from all liability, as it will still be your responsibility to proceed in a prudent, professional and responsible manner.)

Information you provide your clients prior to the work is your professional assessment, whereas statements after things go wrong are viewed as excuses. Always identify any pre-existing deficiencies (contaminated areas, wear, scratches,

dents, knots, etc.) ahead of time to make sure the customer is aware of them. These deficiencies may not always be correctable through your services.

Finish identification: While there are scores or even hundreds of different finishes used on hardwood floors, they all fall into one of the three broad categories described previously: polyurethane, shellacs and varnishes, and hardened oils and/or waxes. Here is how to identify each type:

- **Polyurethane** - The wood will look and feel like a thin layer of plastic is covering it. If you apply a few drops of warm water to the finish, it will bead up and not cause the floor to discolor unless finish has worn through.
- **Shellacs and varnishes** - Sometimes the look will be similar to that of a polyurethane finish. If you apply a few drops

ishes will be considered cleanable by the processes described. In cases of heavy damage or non-polyurethane finishes, referral to a specialist is advised.

If unsure whether results will be successful or will meet with full customer satisfaction, the final step prior to undertaking the project will be to do a site sample, i.e., deep clean and recoat a small area (perhaps a two by two foot area), let dry, then assess results with customer prior to proceeding.

Deep clean and recoat: Before undertaking to deep clean and recoat wood flooring, the first thing to understand is that excess water and wood *do not mix* and employing the cleaning techniques you use on textiles or other hard surfaces may permanently harm or damage wood floors. That's not to say water isn't used, it is just a lot less than what you may be

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of warm water to the finish, within several minutes the finish will look cloudy.

- **Hardened oils and/or waxes** - In contrast to polyurethane, the wood will not look or feel like it is covered, it will look and feel like unfinished wood. Sometimes the look of wax finishes is similar to that of polyurethane, while the feel will be like unfinished wood. If uncertain, test in an inconspicuous area using a white towel and mineral spirits. If it is a wax finish, a brown or yellow transfer onto the towel will occur.

Once any deficiencies have been noted and the type of wood finish identified, the next step is to determine whether you are able to complete the project using a deep-clean-and-recoat process or if it would be better to refer the project to a sand-and-refinish or other specialist. As previously stated, for the purposes of this article only polyurethane fin-

accustomed to. Moisture is important for wood's stability; however, this is controlled by proper ambient conditions.

The second thing to understand is that, especially if a manufacturer's warranty may be involved, the manufacturer's guidelines supersede these guidelines. Remember, if you follow the guidelines of the manufacturer, both in terms of the process followed and the products used, the manufacturer may be responsible for any problems that may arise. But if you vary from those guidelines and problems ensue, you will be responsible.

Begin by vacuuming the floor carefully and thoroughly. Next, damp mop using a microfiber mop and a pH neutral cleaner.

Many floors will have on them previously applied and often unknown treatments and finishes. These may not be compatible with the polyurethane

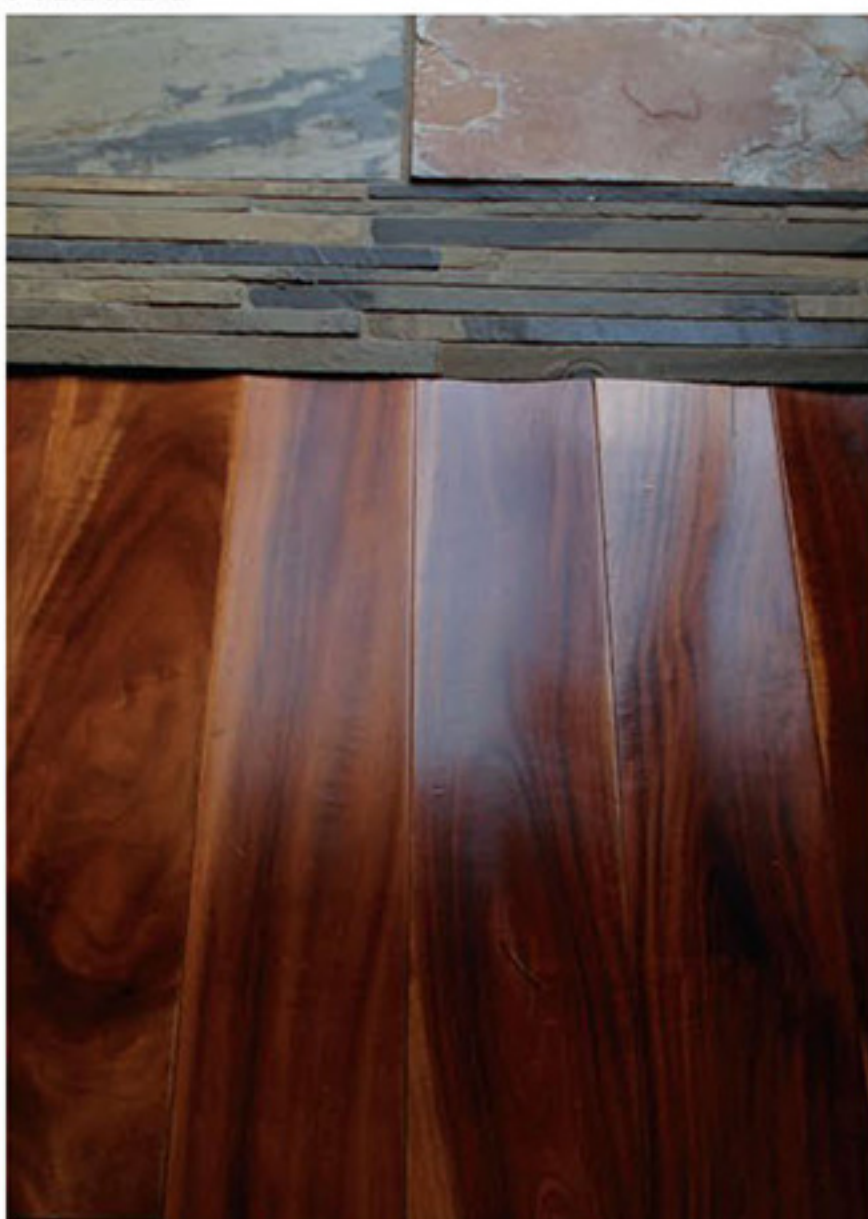
finish you will apply. To remove them, a strong cleaner should be applied, agitated and extracted. Following that, a second cleaner that also serves to neutralize and prepare the floor for recoat should be applied, agitated and extracted. Notes: always use products specially developed for use on wood floors and do not exceed the application rate specified by the manufacturer. Keep in mind the importance of minimizing moisture so as not to cause inadvertent damage.

Once the floor has been thoroughly cleaned and prepared, the polyurethane can be applied. Note: Ordinarily, if a solvent-based polyurethane is used to recoat, it will be necessary to first buff the floor using 180 to 220 grit screens or as recommended by the finish manufacturer, then tack, prior to applying the polyurethane.

Cautions and Conditions to Be Aware Of

- The latest trend in hardwood is rustic/cabin grade with knots, checks and cracks as character rather than defect. When excess moisture enters these character marks, the grain can raise and become splinters/splinters, or stress on the lamella can cause it to become detached from the core. Often the only correction is replacement.

FIGURE 3



Too much water can cause cupping.

FIGURE 4



Before-and-after moisture readings should be taken. The above photos illustrate an eight-percent moisture gain, which is dangerously high.

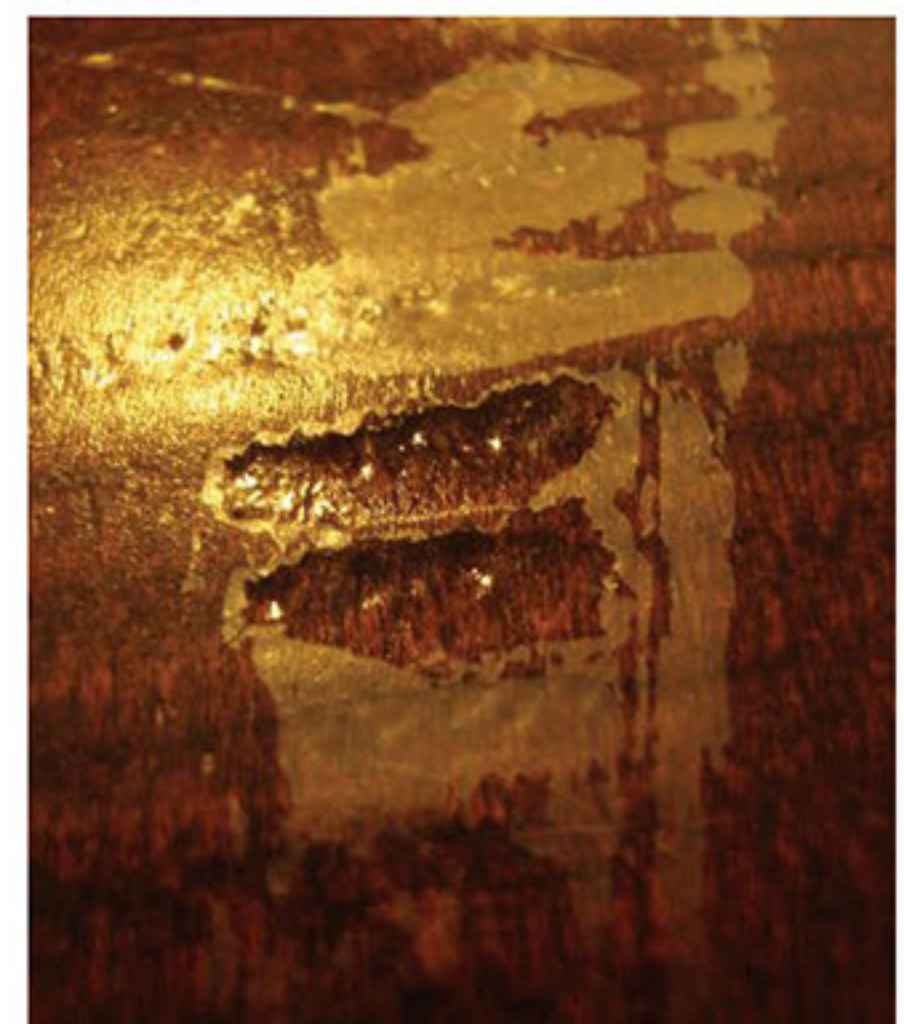
FIGURE 5



- Solid wood floors may experience seasonal gapping where floor boards open up as much as the thickness of a dime or more. Be cautious when applying floor cleaners or finish as it may get down into the gaps creating permanent damage (cupping or sidebonding). Therefore, careful application of the product(s) you use is very important.
- Whether you plan to deep clean or recoat rotary-peeled floors, the lathe checks could present problems. When water (including water-based finish) enters these checks they can become raised and distorted, which can be permanent and ruin the floor. Therefore, minimal use of water is recommended to avoid accentuating this condition, as is the use of solvent-based polyurethane top coatings.
- On floating floors, excess water-soluble cleaning solutions can cause the floor to absorb moisture. Because this type of floor is a connected unit, the entire floor will expand. If the floor is cleaned in high-humidity season, this can cause temporary buckling and break the locking system or edge-glue system, which may require full replacement.

- Always check the moisture content before and after cleaning. A good rule of thumb is to never exceed a two-percent moisture gain.
- Handscraped or distressed-look floors have many large indentations, making it similar to cleaning grout, without using an abundance of water. Soils and contaminants can lie in the low-lying areas, preventing floor finish to adhere properly and to chip and peel later on as shown in figure 6.

FIGURE 6



Ensuring Customer Satisfaction

Many maintenance and restoration companies have written service guarantees or a performance promise to assure their customers the service technician is trained and knowledgeable and will provide the service rendered with proper procedures and products designed for their floor. Just as you would identify the fiber and construction of carpet or fabric prior to cleaning, it is essential to identify the wood type, construction method, grade or characteristics, and type of finish in order to utilize the appropriate cleaning or restoration procedures and products when servicing a wood floor.

This article was developed to provide an overview of the information needed for cleaning contractors considering the addition of wood floor cleaning and restoration services. It is strongly recommended that additional education be acquired

before entering this field. Recently the IICRC added a Wood Floor Maintenance Technician (WFMT) course. In addition, other courses on wood floor maintenance are offered that qualify for IICRC continuing education credits (CECs). Finally, the National Wood Flooring Association (NWFA) offers a plethora of useful information, including inspection, installation, and sanding and refinishing workshops.

For IICRC course information, visit www.iicrc.org. For NWFA education information, visit www.nwfa.org.



>> ABOUT THE AUTHOR

ROY REICHOW has over 40 years of experience in the wood flooring industry as a wood floor contractor, consultant and educator. He is a NWFA Certified Regional Trainer, Installer, Sander/Finisher, Sales Counselor and Inspector and also serves on its board of directors. He is chair of the IICRC's Wood/Laminate Flooring Inspector (WLF) Technical Advisory Committee (TAC). He can be reached at Roy@nwfc.net.

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