CFR The Commercial Flooring Report
For the Commercial Floor Covering Industry
Volume 137 - February 2020 Click here to View and Download all CFR Newsletters

OSB, New Construction and Wide Width Hardwood Flooring

This issue is written and provided by LGM's Associate, David Horan. It deals with OSB, a subject we've never covered, but one we thought important enough to share with you. Since many of you are involved with Multi-Family housing, the Main Street Market or even commercial projects that have OSB substrates the information here will be beneficial to you.

Let's first describe what OSB is. OSB stands for Oriented Strand Board. OSB is a type of engineered wood similar to particle board, formed by adding adhesives and then compressing layers of wood strands (flakes) in specific orientations. It is stronger that plywood and less expensive.

There are a number of factors that have been proven to lead to end user dissatisfaction with the hardwood floors in their new facility. From my own experience, the most common complaint is a noisy floor. Both solid and engineered floors are susceptible to the issues that bring about a complaint of a noisy floor. In new construction, engineered floors have surpassed solid hardwood floors in usage as builders promote products that are thought to be more forgiving to fast-track building practices while also meeting the current fashion trends.

The overwhelming majority of new homes and wood structure facilities have some form of OSB (oriented strand board) used as subflooring. Most of the forest product companies that make these materials have several products in their line. The performance attributes of their OSB products are reflected in their pricing structure. There is a good, better, best hierarchy with tangible performance differences. Some OSB products are marketed as "Enhanced" or "High-performance" in an attempt to help the purchaser distinguish them from commodity OSB panels. High-performance OSB products are intended to provide increased fastener holding ability while providing greater strength and stiffness. They are frequently intended to resist moisture absorption and the resulting swelling.

Pre-Installation of subfloor

When OSB reaches the end of the production line it has a low moisture content. The flakes of different species of wood have been combined with adhesives and pressed into the intended thickness panels. Everyone understands that a dry towel can absorb more water than an already wet towel and the same analogy holds true for OSB. The OSB panels are much more likely to absorb moisture after they leave the factory than they are to lose moisture content. The panels can get the moisture from the surrounding air, they can get rained or snowed on, or they can be submerged in puddles on jobsites.

The LGM Substrate and Moisture Seminar

is being sponsored by Tucson Commercial Carpet " Flooring in the Desert"

* Place: Hacienda Del Sol Resort - Tucson Seminar & Trade Show

  5501 N Hacienda Del Sol Rd, Tucson, AZ 85718

* Date: March 12th, 2020—Time 7:00 am to noon
* Continental Breakfast will be served
* Please contact Agnes Sheldon at: 520-240-4134 or ashedon2019@gmail.com

Speaker: Lewis G. Migliore—Why flooring and installation systems fail, how to avoid and resolve failure. We'll show issues on concrete and the science of it, flooring failures of varying types caused by moisture with pictures. This is a very unique and eye opening presentation that you won't want to miss.

When OSB gains moisture content it gets thicker or swells. Sometimes the swelling is dramatic and easily seen at panel edges. Other times the swelling is more consistent throughout the entire panel. Up until a certain moisture content the panels have the ability to return to their original thickness when dried back to their original moisture content. This is similar to the way solid wood behaves in an almost perfectly elastic manner with small gains and losses of moisture. If the panels gain enough moisture to surpass this point, they will never return to their original thickness. The wetter they get, the thicker they will swell to and the less they will return towards their original dimensions. Wood fibers get torn, sheared, compressed, and glue bonds get broken. The OSB manufacturers know the figures from their internal research but this data will never be made public and it does not need to be. The test results not only vary from one of their products to the next but they also vary from one factory to the next and one batch to the next. Different locally available species of wood flakes used in the OSB has an influence on this as does the weather on the day of production.

Post Installation, Pre-occupancy

Once the panels are taken from their shipping pallet or their cube is broken, they are installed over the floor joists in the new structure. They are no longer somewhat protected as a result of being tightly banded together with only their treated edges visible and in contact with the surrounding conditions. The top and bottom sheets on the stack are anomalies. The framed structure is usually not closed-in and made weathertight for anywhere between a few days to several months. During this time the panels are almost completely exposed to the ambient conditions on all sides. Even though they have been treated to resist moisture absorption, they still are hydrophilic and will gain some moisture. How

THE COMMERCIAL FLOORING REPORT
Lew Migliore - President
P (706) 370-5888 or Email: lgmtcs@optilink.us

Just click here to go to our website for all CFR articles
LGMANDASSOCIATES.COM

much moisture they gain is a factor of how wet they get (moisture gradient) and how long they are exposed. The phenomenon of hysteresis is at play as well. Water absorption into wood is not instantaneous but takes some time. The absorption lags behind the exposure.

The Virginia Tech Subfloor Test Report stated: “The lack of protection of subflooring from weathering, before the installation of oak flooring, significantly reduces floor quality.” It seems that many still do not heed this warning.

Post Occupancy

For the most part, at least in much of the country, the OSB will lose moisture content after the space gets moved into. The heat and air conditioning will pull moisture from the subfloor panels in most cases. It is possible that a wet basement or crawlspace will lead to an increase in the moisture content of the subfloor in an improperly designed or constructed structure. Hardwood floors perform best if they are kept in conditions that remain in a fairly narrow range. Generally, a 20% relative humidity range accompanied by a 10° temperature range is recommended to prevent significant movement of the wood products in the space and allow optimum product performance. In order to keep the space in such a narrow range it is almost certainly necessary to run the air conditioning and possibly a supplemental dehumidifier in the hot weather and run a humidifier during the heating seasons. New buildings are much more tightly constructed than they were just a few decades ago. Builders and contractors use sealants and wrap to minimize drafts and air exchange with the outside. This also keeps moisture in or out of the structure. Lumber products that were damp during construction will take longer to dry out since there is so much less air exchange than there used to be. New structures now are very much like a plastic bag used to store bread in.

Fasteners

The fasteners used to install hardwood floors have a wide range of lengths and gauges depending on what kind or thickness of hardwood floor one is installing. Testing done years ago at Virginia Tech for NOFMA (National Wood Flooring Manufacturer’s Association) concluded that for solid hardwood floors there was little difference in the ultimate performance of the different fastener types (staples or cleats). There was little difference found between plywood and osb subfloors, as well. This test was done with solid oak strip flooring and does not present any data for plank, wide-width plank, or any width engineered flooring.

Some flooring manufacturers have adopted guidelines that have different fastener scheduled for staples versus cleats. Cleats are not required to be placed as close together by some flooring manufacturers. This is because their internal research has shown cleats to have slightly better withdrawal resistance. Other manufacturers and the NWFA 2019 Installation Guidelines do not have different fastener schedules for the different fastener types. Fastener schedules and lengths are determined by the width and thickness of the flooring being installed. Cleats are recognized for their ability to be placed closer together without causing damage to the board tongues.

The tiny little wire staples and cleats used to install some engineered flooring are known to have very little withdrawal resistance. They require less effort to pull them from the subfloor than their more substantial counterparts used on ¾" solid flooring. Additionally, they are often shorter than their larger cousins used on solid flooring so there is less fastener actually in the subfloor.

OSB manufacturers have long known that fastener withdrawal figures are inconsistent from one fastener to the next, literally. They need to test using very high numbers of fasteners so that they can get an accurate representation of the typical or average fasteners holding power. One fastener may be plucked out with bare fingers while another fastener an inch away requires pliers to remove. The inconsistencies are more dramatic for the smaller fasteners used for engineered floors than they are for the beefier staples or cleats used on solid floors. This is part of the reason these smaller fasteners are usually required to be placed closer together by the manufacturers.

"Oriented Strand Board (OSB) – swelling can occur with OSB when exposed to water. Swelling in OSB can create a decrease in density and a reduction in within-board strength due to the release of compaction stress created during the pressing process of manufacturing. This will directly affect how existing fasteners hold the wood flooring to the subflooring material. Replace when damage is evident. Ensure replacement material is within acceptable MC ranges prior to reinstallation of wood flooring."

Source: NWFA Technical Publication No. A100, Moisture and Wood, Revised 2017, 2nd Edition

Wider Planks

The new NWFA Installation Guidelines state that on both solid and engineered floors of >5" widths the glue assisted installation method should be used. Note that they do not say the glue assist method must be used. Also note that these guidelines do not apply to 90% or more of the noisy floors we encounter which are 5" wide. There is no mention of what should be done on floors that have, say 4", 5" and 6" planks. There is recognition by the NWFA that wider plank floors are not well held in place by fasteners alone as a result of fewer fasteners per square foot. The counter to that belief would involve placing fasteners every inch along tongues of wide planks. Even without any damage being done to the tongues it is more likely that a noisy floor will result than a narrower strip floor installed with the same number of fasteners per square foot. The number of fasteners per square foot is only one component of the noisy floor equation.

See Page 7 regarding Excess

Inventory Offer

There are reasons contractors and builders largely prefer OSB to plywood. OSB sheets are flatter when working with them compared to plywood sheets. How are most engineered floors constructed? Most are plywood with the desired species used for the top layer. This means that most engineered flooring behaves very much like regular plywood. Rip a sheet of plywood into strips of whatever width you like and lay them on a flat surface to see a demonstration of the kinds of distortions that are possible. Solid lumber isn't much different as anyone who has jointed boards together can attest to. The wider the pieces, the farther from the flat surface they will likely lift.

Take Aways

1. OSB that has gotten very wet has greatly diminished fastener holding power. It will have swollen to a greater thickness and it will have the corresponding loss in density. It is possible that the osb will have dried to an acceptable moisture content before the flooring installers show up and test the subfloor moisture levels. The osb tests fine following standard jobsite testing protocols yet it is severely compromised and unable to hold fasteners well. Installers don't check subfloor thickness with calipers, they read the grade stamps on the underside of the subfloor panels.

2. OSB manufacturers have a pretty good idea about how wet a sample of swollen osb has gotten in the past if they have the current moisture content and the thickness. There are a lot of variables but they can say with a reasonable degree of certainty if the osb had gotten really wet in the past and had its fastener holding ability irreparably compromised. Their better osb products will perform better than their commodity or mid-line products.

3. OSB that is at the upper edge of the acceptable moisture content range at the time the flooring is installed will eventually dry down to normal, occupied space levels and lose some of its ability to hold fasteners. The wood fibers dry and shrink away from the fasteners resulting in a small metal shaft in a larger hole in the wood. Osb at 14% mc (moisture content) that has wood installed will lose 6% mc as it gets to 8% in the occupied space. If the osb is 10% and dries to the same 8% it will have lost just 2% or 1/3 as much moisture. The lessening of the fastener holding strength as a result of wood fiber shrinkage in the osb around the fastener legs will be just 1/3 of the decrease in the other scenario. The wetter the osb is at the time of hardwood flooring installation, the greater the likelihood that a noisy floor will eventually result.

4. Structures that have wide engineered floors (4" or wider in my book) that are installed with mechanical fasteners alone over osb subfloors and have no properly functioning humidifier are asking for trouble. The larger seasonal swings in humidity bring about greater wood flooring movement as a result of dimensional and planar changes in the flooring. This loosens the fasteners a bit more with every change. Fasteners have absolutely no ability to re-seat themselves as the progressive floor failure occurs.

5. "In new construction, it is the responsibility of the Builder and/or the Specifier to ensure the facility being built is designed and capable of sustaining an environment conducive to the building materials being used in it." This is a quote from the 2019 NWFA Installation Guidelines, p.27.

6. It takes longer and therefore costs more to install the floor following a superior method such as glue down or glue assisted nail down.

7. Adhesive is inexpensive and it greatly reduces the likelihood of a noisy floor. It will cost much more to remove a floor and replace it. In many cases the flooring material itself can be re-installed to give a completely satisfactory job. The boards must be lifted, the fasteners pulled, the tongues cleared of any errant wood fibers, and then reinstalled either by glue down, glue assisted nail down, or nail assisted glue down methods.

8. There are many liquid applied "paint-down" vapor retarder products currently on the market. These are made by the same companies that make adhesives used to glue down wood floors. I believe it is irresponsible for flooring manufacturers of wide width products to largely ignore these kinds of products while they do not strongly recommend or require that the flooring be installed by better performing methods than nail down alone. Manufacturers do not provide warranty coverage for noisy flooring but they do have builders and contractors trying to make profits as their largest customers.

Some additional important information

Let me add one other item that you may experience with OSB or particle board. It is not a great substrate for gluing sheet vinyl to. First, the binders used may react with the flooring and the adhesive. Second, the dark pieces which are bark or dark wood can leach through the sheet vinyl and create a stain. Just know this ahead of time and make sure you use the sheet vinyl flooring manufacturers approved substrate material, so you don't wind up with this problem. If you do, you own it and our job is to keep you out of trouble.

Our thanks to Dave for this information. Remember, if you need help on a project ahead of time or have a problem you need an answer for, call us. There is always a reason for what you're experiencing, and we always have the answer.

Where am I speaking? I'll be doing presentations at:

NeoCon—Tuesday, June 9, 2020—Time: 9:30 a.m., on "Flooring Products: What You Need to Know",

NFMT Baltimore—Thursday, March 19, 2020—Time: 2:45 pm—" The Latest Trends in Flooring"

And for 2020 we have a unique new educational and information program we'll be unveiling soon.

The LGM Substrate and Moisture Seminar

is being held by Tucson Commercial Carpet:

* Place: Hacienda Del Sol Resort (Your room is also at Hacienda Del Sol) - Tucson Seminar & Trade Show
* Date: March 12th, 2020
* Time 7:00 am to noon you will speak starting at 8:30 am
* Continental Breakfast will be served
* Please contact Agnes Sheldon at 520-240-4134 or Email asheldon2019@gmail.com

Speaker: Lewis G. Migliore—Why flooring and installation systems fail, how to avoid and resolve failure. We'll show issues on concrete and the science of it, flooring failures of varying types caused by moisture with pictures. This will be a very unique presentation that will be very eye opening and informative.

Excess Inventory Offer

Most of you have flooring material sitting around that's taking up space and costing you money.

Dispose of your excess inventory - remnants, hospitality carpet, carpet tile and any hard surface flooring materials. Avoid paying insurance or taxes on flooring materials taking up rack space and convert it into cash.

We have a contact in Calhoun, GA that will pay you for this material and arrange for shipping from your location. They'd need a complete inventory of what you have so they can make you an offer. This firm is well financed and established with a stellar reputation.

This is a great opportunity to get rid of merchandise taking up space and make some money in the process. Call or email Kolt or Cynthia with any questions so they can help you.

surplus@overstockfloorzusa.com

Kolt Privett - 770-530-4709
Cynthia Potts - 706-271-6767

Thanks,
Lew Migliore