The Importance of Measuring Moisture

by Grete Heimerdinger

Building moisture and humidity is followed by two different serious problems.

First, changes in moisture content in wood products are accompanied with dimensional changes which ruin the beauty and functionality of wood products. Just a few examples: wood floors in gymnasiums cup, chairs de-laminate, doors do not close easily.

The second problem is more serious: mold. Mold not only affects the structural integrity of buildings, it also affects the health of the occupants in the building.

Mold is a fungus living by its own rules. Spores are the start of any mold growth, and they are ever-present anytime, anywhere, dormant and waiting for the right conditions. Once enough humidity is available, mold will start to grow on any carbon-containing surface; buildings harbor many such surfaces, from concrete to sheetrock, wood, and even paint (unless carbon-free paint has been used). As mold digests its food, toxic compounds are released into the air; once the mold is mature, spores are produced and released into the air by the millions. Both the toxic compounds and the spores contaminate the air and can cause serious health issues. For these reasons, moisture and humidity in buildings have to be kept in a safe range.

Improper cleaning practices, water spills, a roof leak, a burst pipe, or—worst of all—a flood can cause problems. Under normal circumstances, buildings are only exposed to seasonal changes, which can generally be kept in check with a HVAC system. Here are some numbers for the extremes:

- At 70°F and 35% relative humidity, the equilibrium moisture content (EMC) for wood is 7%, representing ideal conditions.
- At 85°F and 85% relative humidity, the EMC for wood is 17.5%, as in moist summer.
- At 32°F and 20% relative humidity, the EMC for wood is 5%, as in dry winter.

Detection is the first step in prevention of moisture-related issues. A moisture meter and a thermo-hygrometer are the right tools for detection of conditions of wood floors which are experiencing conditions outside the ideal range of 6-9% moisture percentages and 30-50% relative humidity at 70oF. These tools will help to pinpoint any problems and areas of concern.

Wood Measurements

Measuring the moisture in wood was more straightforward when all wood floors were made from solid floor planks. Measuring solid floor planks requires a meter calibrated for different wood species, and the user has to set the meter to the floor species for measurements. Pin and pinless meters can be used to measure floor planks. If it is suspected that the moisture problem originated in the subfloor or the concrete underneath, then a pin meter is required with a depth electrode to investigate moisture conditions in the subfloor.

Wood Moisture Equivalent Measurements

Engineered floor planks composed of a wear layer and a different material core can be measured with a wood moisture meter as well. The meter may need to be calibrated to the specific engineered floor plank; this calibration can be fairly easy if a sample acclimated to a certain relative humidity is available. For example, in an environment of 45% relative humidity, the sample's moisture content can be assumed to be around 7%. The test sample can be measured and then the calibration setting adjusted until the meter reads 7%. Future measurements of that particular floor can be measured at that setting. Once the calibration setting has been established, all future measurements can be compared to the preliminary values.

Reference Scales or Comparative Measurements

Many materials besides wood are used in the building envelope. If the moisture meter has a calibration for a specific building material, maintenance personnel can choose the

calibration for measuring the material. To make sense of the different scales, users must know what value represents dry. For example, wood floors are considered dry at 6-9%, moldings are considered dry at 12%, and construction lumber is considered dry at 16%. When measuring drywall with a drywall scale, the values are very low because of the ratio between the small weight of water and the larger weight of the material. Here the manufacturers of the meters may state a value of 0.5% for being dry and 0.8% already questionable.

Many materials used within buildings are not listed for any moisture meter; for these materials, the only way to establish moisture levels is by using a reference scale. Most meters have a reference scale, which divides the maximum moisture range between low and high moisture values into equal parts. For meters that do not have a reference scale, users can dedicate a calibration setting to measure a particular material, then take comparative measurements to determine whether all pieces have the same moisture content or whether some have higher values, meaning more moisture, and some have lower values, meaning less moisture. This strategy can only be applied if the measurements were taken of the same material with the same calibration setting. This detail should be noted because measuring at different depths could result in measuring different materials. This method becomes more meaningful if a dry piece of the material can be found, since all measurements can then be compared to the dry value.

Maintenance crews should document moisture levels in critical areas even if there are no apparent moisture problems. On a regular basis, maintenance personal should take measurements, note the measured value, the calibration setting, and the location where the readings were taken, along with the meter's measuring mode, the meter's name, and the meter's manufacturer.

When moisture problems are discovered, the first step is to establish the extent of moisture infiltration by using a moisture meter. Problems might be confined to the surface, or they could come from sources farther away within walls, roof, or the foundation of the building. A combination pin and pinless meter with suitable hand probes is the best choice to map moisture problems and locate their source. In many cases, professional help is required to remedy the problem quickly before more damage has occurred and the environment is contaminated by mold.

ABOUT THE AUTHOR: Grete Heimerdinger has been the technical adviser for the moisture meter division for Lignomat. She graduated from the technical university in Stuttgart and started Lignomat with her husband in 1982. Lignomat now offers a full line of pin, pinless, and RH meters as well as wireless monitoring devices for buildings. Visit www.lignomat.com; 800-227-2105.

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