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Moisture Problems: A Homeowner's Biggest Nightmare?

By Gordie Blum, FPL public affairs director

You've seen the headlines. "Mold closes school." "House razed due to mold problems." Or even worse, "Serious health problems attributed to toxic mold."

"Insurers thought asbestos was the crisis to end all crises. Mold will make asbestos pale in comparison," said one insurance adjuster recently on ABC News.

Moisture-related problems such as mold have been around for as long as humans have lived in shelters. Cave dwellers probably complained about the condensation that was forming on their rock ceilings. But it is really over the past 15 years that mold has emerged as a major financial and health problem for the American public. Recent high-profile cases have made "mold" perhaps the biggest issue facing building construction

related industries. Some of the more prominent cases include activist Erin Brockovich suing the Los Angeles construction company that built her home; entertainer Ed McMahon suing his insurance company for \$20 million claiming toxic mold killed his dog; and the Washington, D.C., Ritz-Carlton (where Michael Jordan has a condo) undergoing extensive renovations due to mold.

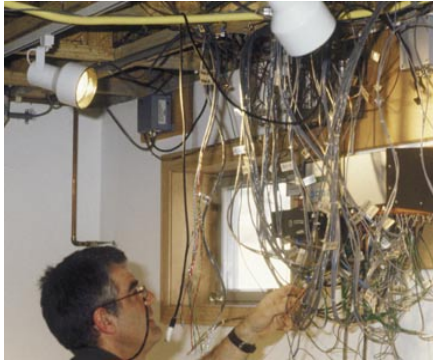
Moisture-related building problems are also nothing new to the Forest Products Laboratory (FPL). The FPL, which opened its doors in 1910, has been looking at moisture-related problems in houses and buildings for over 50 years. Researchers here say the real key to preventing the problem is relatively simple: Stop moisture from accumulating in your home.

"Mold is usually the end result of a bigger problem: too much moisture in your home," says Anton TenWolde, the FPL Advanced Housing Research Center's lead researcher on moisture intrusion. "Taking some simple precautions, such as properly installing doors and windows, providing proper drainage around the building, and taking care to prevent building materials from getting wet during construction,

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Inspectors check the underside of a wooden floor for fungal growth. The floor was located in a Scottish castle. The damp castle was an ideal location for fungal growth.



Top: Charlie Carll, forest products technologist, installs moisture monitoring equipment in the basement of FPL's Research Demonstration House.
Bottom: OSB sheathing decayed from moisture accumulation under the siding of a condominium.

Moisture (continued from page 1) will usually prevent mold from becoming a problem in your home.”

TenWolde says that a number of myths and misunderstandings about moisture control have become entrenched in the building industry and in the minds of homeowners. He says this can lead to less effective measures for moisture control, and in some cases, unnecessary or even counter-productive measures.

TenWolde is heading a team of FPL researchers who will be looking at several sources of moisture intrusion. Some of the research will take place at FPL's Research Demonstration House, a 2,200-square-foot home built in conjunction with APA–The Engineered Wood Association and the Southern Forests Products Association. However, a key element of FPL's research

plans center on building a state-of-the-art moisture research facility.

“The facility will allow us to control and manipulate home interior conditions,” says FPL assistant director Mike Ritter. “The Research Demonstration House is great in that it allows us to study things over time, but obviously we're limited to studying them in whatever the weather conditions are in Madison, Wisconsin.

The new facility will allow us to test innovative techniques, designs, and products in a variety of climates and, even more importantly, will allow us to get results quicker. It means getting better, more accurate information to the American public.”

Ritter says that while most agree that excessive moisture in buildings is the root cause of mold problems, useful information on water intrusion is anecdotal at

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Check out our website at <http://www.fpl.fs.fed.us>

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best, primarily because of the great variety in building practices, building sites, and climate. The proposed FPL moisture research facility will enable measurement of wetting and drying under controlled, but realistic, conditions, allowing evaluation of different designs and construction techniques. In addition, the facility will allow assessment of the effects of rain, wind, sun, temperature, and humidity. He says researchers at the new facility would monitor and assess several factors:

- Water intrusion into typical residential wall components
- Drying of components under a variety of indoor and outdoor conditions
- Occurrence and species of mold growth
- Potential for structural damage
- Potential damage to paint surfaces
- Potential for reduced indoor environmental quality due to mold

“We’d like to thank Senator Herb Kohl, Senator Russ Feingold and Congresswoman Tammy Baldwin for their efforts to get us funds to build this facility. We know budgets are tight right now, but this is a real need for both home builders and consumers,” Ritter says.

Ritter also emphasizes that the Advanced Housing Research Center will soon have a new website chock full of useful housing information. A vital part of the website will be a moisture information repository called The Moisture Management Network. The Network is a result of FPL’s partnership with APA—The Engineered Wood Association, in cooperation with the HUD Healthy Homes Program.

“I think this is a perfect role for us to play,” says Ritter. “Along with our partners, we want to serve as the Federal

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One-step test for early detection of decay

By Rebecca Hoene, FPL public affairs specialist

Billions of dollars are spent annually to replace wood destroyed by decay fungi. But damage from these destructive fungi can occur even before you see signs of a problem. That’s why early detection is key to prolonging the service life of wood products.

Researchers at the Forest Products Laboratory have developed a one-step test that is a fast, inexpensive, and accurate way to determine if decay fungi are present in wood.

“The decay test is very easy to use,” says microbiologist Carol Clausen. “You simply take a small sample of wood and soak it in the liquid provided in the test kit. When the liquid is applied to the test cassette, a color change occurs if decay fungi are present.” The test works by detecting the presence of an enzyme produced by decay fungi.

The decay test can be used for a wide variety of applications. Inspectors, millwork companies, structural engineers, and woodcrafters will find many uses, including building inspections, historical restorations, and general maintenance of wood products.

However, Clausen believes the biggest advantages are for the homeowner.

“Homeowners will benefit greatly from the use of this test,” says Clausen. “If you can detect decay early enough, you can stop its progress before it causes structural damage. Knowing where decay is present will reduce maintenance costs and prevent unnecessary replacement of wood.”

The test kit has been patented, and licensing and commercialization are pending.





ASK FPL

Wood is a valuable resource that is part of our daily lives. Unfortunately, humans aren't the only creatures who find wood useful. Here are some common questions we've received when other critters wanted to share the wealth.

I've been storing some old lumber in my barn for about two years. I planned to use it for flooring, but I recently discovered several tiny holes in the wood surrounded by a fine powder. This looks like an insect problem. What can I do to stop the infestation?

Pinholes that are surrounded by or filled with a fine powder can be a sign of powder-post beetle infestation. Beetles lay eggs in

the pores of the wood, and the larvae burrow through the wood, making tunnels and leaving them packed with a fine powder. The holes you see are exit holes made by winged adult beetles as they emerge from the wood.

Powder-post beetles attack both hardwoods and softwoods and both freshly cut and seasoned lumber. Once the wood is infested, the larvae will continue to develop even if the wood is painted, oiled, or varnished.

Several tactics can be used to stop the infestation. Kiln drying the lumber will kill the

beetles, larvae, and eggs. Soaking the infected wood in a petroleum oil solution containing an insecticide can also stop an infestation. Once the wood is free of living insects, future powder-post problems can be prevented by

covering the entire surface of the wood with a suitable finish.

Source: "The Wood Handbook" available at www.fpl.fs.fed.us

Recently a woodpecker has begun pecking the cedar siding on our home. We're not sure what's worse, the potential for damage or the noise! What's causing this and how can we stop it?

No one knows exactly what attracts woodpeckers to buildings. Some theories include a shortage of natural nesting sites, feeding on insect larvae in the siding, or drumming to attract a mate.

Woodpeckers are usually attracted to buildings near the eaves where they can get a good foothold. The best way to prevent further woodpecker damage is to hang netting 2 to 3 inches from the side of the building. The netting can be attached to the overhang and then angled back to the siding below the damaged area and secured taut. Make sure the netting is far enough away that the birds can't cause damage through the net, and secure it well enough that they can't get behind it.

Many available devices are geared toward scaring the birds away. They range from highly visible, reflective pieces that blow in the wind to recorded devices that produce distress cries or ultrasonic sound waves that people cannot hear. While these devices may work for a short while, they are usually ineffective once the birds get used to them.

If you would like to keep the woodpeckers in your area, consider providing nest boxes for them. You could also construct a drumming area for the birds by securing a metal cylinder, such as a gutter downspout, to a tree. These tactics will help keep the woodpeckers happy and your house (and hearing) damage free.

Source: USDA Forest Service publication, "How to Prevent Woodpeckers From Damaging Buildings"

Questions?

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New and Notable

Comparison of Wood Preservatives in Stake Tests— 2000 Progress Report

Crawford, D.M.; Woodward, B.M.; Hatfield, C.A., comps. 2002.
USDA Forest Serv. Res. Note FPL-RN-02 (Rev.): 120 p.

<http://www.fpl.fs.fed.us/documnts/fplrn/fplrn002.pdf>

This report—the last and final revision of FPL-RN-02—covers stake test results primarily from Southern Pine 2- by 4- by 18-in. sapwood, treated by pressure and nonpressure processes, and installed by Forest Products Laboratory employees and cooperators in decay and termite exposure sites at various times since 1938 at Saucier, Mississippi; Madison, Wisconsin; Bogalusa, Louisiana; Lake Charles, Louisiana; Jacksonville, Florida; and the Canal Zone, Panama. Also included in the tests at Saucier, Mississippi, are smaller pine stakes and those of treated and untreated plywood, particleboard, modified woods, laminated paper plastic, pine infected with *Trichoderma* mold, plus other selected wood species such as oak, Douglas-fir, and Engelmann spruce. In addition, this publication contains information regarding the future of the FPL treated-stake testing program.

Acoustic Emission and Acousto-Ultrasonic Techniques for Wood and Wood-Based Composites—A Review

Kawamoto, Sumire; Williams, R. Sam 2002. USDA For. Serv.
Gen. Tech. Rep. FPL-GTR-134. 16 p.

<http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr134.pdf>

This review focuses on the feasibility of acoustic emission (AE) and acousto-ultrasonic (AU) techniques for monitoring defects in wood, particularly during drying. The advantages and disadvantages of AE and AU techniques are described. Particular emphasis is placed on the propagation and attenuation of ultrasonic waves in wood and the associated measurement problems. The review is divided into two sections, acoustic emission techniques and acousto-ultrasonic techniques. It includes historical background on the techniques as well as applications for wood and wood products. Because much research on nondestructive tests for wood has been published only in Japanese, considerable attention is given to those publications.

Improving engineered wood fiber surfaces for accessible playgrounds.

Laufenberg, Theodore; Krzysik, Andrzej, M.; Winandy, Jerrold, E. 2003.

Gen. Tech. Rep. FPL-GTR-135. Madison, WI: U.S. Department of
Agriculture, Forest Service, Forest Products Laboratory. 15 p.

<http://www.fpl.fs.fed.us/documnts/fplgtr/fplgtr135.pdf>

The goal of our research was to develop a playground surface material that cushions impact and is accessible to people with disabilities. In the initial screening phase, we evaluated a variety of in situ surface treatments and mixtures of wood particles combined with various binders. In the scale-up phase, we evaluated commercially available EWF and several promising binding systems from the screening phase trials. In this report, we identify the strengths and weaknesses of the surface treatments, review the viability of the systems and the testing concepts we have developed, and identify further research needs.



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On the Calendar

May 19–20 7th International Conference on Woodfiber–Plastic Composites, Monona Terrace Convention Center, Madison, WI

The purpose of this conference is to explore the nature, structure, and properties of wood/natural fiber–plastic composites and to encourage the exchange and dissemination of information on processing methods, performance measures, and useful products.

The conference will offer 35 formal presentations, along with a number of poster presentations and tabletop exhibits offered during two evening receptions.

For more information, contact the Forest Products Society at (608) 231-1361, ext. 208, or at conferences@forestprod.org

June 9–12 12th International Symposium on Wood and Pulp- ing Chemistry, Monona Terrace Convention Center, Madison, WI

The symposium consists of many contributions, including speaker presentations and poster sessions, that will make for stimulating discussions and allow participants to hear about the most recent developments in wood and pulping chemistry from around the world.

More information is available at www.forestry.auburn.edu/iswpc2003 or contact Sally Ralph at (608) 231-9449 or sralph@wisc.edu

Moisture *(continued from page 3)*

clearinghouse for moisture-related information. If homeowners have a problem, we want to be the place they can go to get the information they need.”

Other FPL moisture-related research includes designing and testing innovative early detection techniques to stop decay before it becomes a problem, evaluating new and existing fungicide formulations, and studying the chemistry to understand why mold favors certain composites.

*For more, visit our website:
www.fpl.fs.fed.us*

Look soon for a new and improved Advanced Housing Research Center web page!