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Fire-Retardant Trusses at Risk

Litigation and repair work involving failed fire-retardant treated (FRT) plywood is still in full swing. According to some experts, however, the same chemical process that ruined the plywood is causing a slower but more dangerous problem: the degradation of roof structural systems built with FRT framing lumber.

FRT plywood failures can take from two to ten or more years to develop. Problems with the plywood have been seen in thousands of condos and townhouses, where the plywood was used on roofs to prevent fires from spreading from unit to unit. Over the years, gradual degradation had caused plywood on these roofs to sag and crumble. Workers have even been known to fall right through FRT plywood roof sheathing. Fortunately, few residential units have any FRT wood in their framing.

Experts involved in FRT plywood cases say framing failures may be the next wave

Many commercial buildings, on the other hand, have trusses or rafter systems made of FRT dimensional lumber. Now the owners of some of these buildings are starting to show up in court, alleging that the trusses are failing in normal service. Some experts familiar with FRT truss problems say the present failures are only the tip of the iceberg; they expect a wave of failures in coming years.

Acid attack. The types of fire-retardant chemicals injected into plywood and dimensional lumber in the mid and late '80s were designed to protect wood in a fire by creating a layer of flame-retardant char. The chemicals are supposed to start working when the wood gets almost hot enough to burn. But later testing showed that the chemicals sometimes kick into action at much lower temperatures. Researchers at the U.S. Forest Products Laboratory (FPL) in Madison, Wis., say long-term exposure to 130°F temperatures will cause degradation of some FRT wood; exposure to 180°F can cause rapid deterioration and strength loss. (Asphalt-covered roofs in direct sunlight often reach 200°F.) In the charring process, the acid chemicals destroy the wood fibers, leaving the wood brittle and weak.

The FPL testing was done

continued

Remodelers Help Out the Disabled

The Americans With Disabilities Act guarantees handicapped Americans access to public and commercial buildings. But that's not much help to people who can't get down their own front steps. Responding to this need, remodelers and local lumberyards across the country banded together last year to build access ramps for the homes of disabled people. The program, known as Rampathon '93, was a project of the Remodelors' Council of the National Association of Home Builders (NAHB).

Chris Nicholson of the national Remodelors' Council said local councils participating in Rampathon used donated materials to build over 100 ramps free of charge. But the response to publicity over the program has revealed a continuing unmet need, he said; he has received more than 400 inquiries since the program ended.

John Walden of Walden Construction in Waltham, Mass., said his crew knocked out their ramp over one weekend. "We've been pretty busy," he said, "but we wanted to get it done before the end of the year." Walden also has found out about the demand for more ramps: "After we got our picture in the paper with the mayor, I got 13 calls right away," he said. Boston area remodelers built a total of eight ramps during Rampathon.

REMODELORS' COUNCIL

Carpenters with Walden Construction spend a weekend building an access ramp during Rampathon '93.

If you're building an access ramp, talk to local code officials about specifications — the federal Americans With Disabilities Act doesn't cover residential installations. Ramps in your area might be exempted from zoning rules such as setback requirements. "We were able to build ours right out to the sidewalk," said Walden. □

STATE BY STATE

Rhode Island. The governor has signed into law a bill giving homeowners a $1,000 tax credit for residential lead removal or abatement. The work must be performed by a licensed lead abatement contractor and okayed by a state-certified inspector to qualify. For information, call the state Department of Environmental Risk Assessment at 401/277-3424.

Vermont. A new program established by the National Trust for Historic Preservation will award cash prizes to Vermont farmers for preserving historic barns. Thousand-dollar prizes will be awarded to winners in each of four categories, including converting an old barn to a new farm use and adapting an old barn to a non-farm productive use.

Massachusetts. OSHA officials in the North Boston area will step up enforcement of fall protection rules through June, following the deaths of workers from falls on four area construction sites. OSHA will be pulling surprise inspections, and will also provide seminars on fall protection. Call OSHA's Methuen office at 617/565-8110 for info.

Connecticut. The merger of two union locals by the United Brotherhood of Carpenters president has been voided by the U.S. District Court here. Judge Peter Dorsey ruled that court findings "suggest a lack of democratic governance of the union." The election of the union's president, Sigurd Lucassen, is being investigated by the Department of Labor.

FRT, *continued*

with monoammonium phosphate (MAP), an ingredient of some commercial FRT preparations used in the '80s. FPL researchers observed less severe results with some other chemicals in different proportions. But they also observed that the degradation reported from the field was often more severe and more rapid than what they had seen in the laboratory, leading them to look for other contributing factors.

One possibility, says the FPL, is that wet, freshly treated lumber and plywood may have been redried at too high a temperature, causing strength loss before shipping. So the FPL suggests that anyone buying FRT lumber makes sure that the lumber was dried at a temperature below 130°F and was tested for residual strength.

Whose fault is it? Building owners, FRT treaters, and builders are arguing in court about who to blame the FRT failures on. A lot of money is at stake on the liability issue. Most private experts on FRT treating have been enlisted by one or another party to the court cases, making unbiased information hard to come by.

Experts for the lumber-treating firms point to installation problems and building design factors as contributing causes for failure. Lumber was installed wet in buildings without adequate ventilation, they say; and the resulting moisture has contributed to the weakening of these structures. "If we see two buildings on the same street in the same town, and only one has the problem, it must be something about the building," said one expert. (Because of pending litigation, the parties involved would only speak to us on condition of anonymity.)

Experts working on behalf of building owners and contractors blame heat alone for both plywood failures and the alleged truss failures. "Moisture is a very minor player," said one. Another stated: "The humidity argument is a lot of [bunk]." According to their position, the hotter the treated wood gets and the longer it stays hot, the faster the wood fibers break down.

MARK R. KRUEGER

The bottom chord of this FRT truss broke in service. Tension members are especially vulnerable to damage.

Roof trusses don't get as hot or stay hot as long as plywood sheathing nearer the roof's surface. But according to this view, if the trusses get hot enough some of the time, they too will deteriorate — just more slowly. "As long as you continue to provide the heat, the process will continue," said one expert who is testifying on behalf of building owners. He predicted that there will soon be hundreds or even thousands of cases of FRT failure.

Eventual repair bills could be "staggering," another expert said. "It's a relatively easy thing to replace the plywood," he said. "When you start pulling trusses out, and the ceiling is attached to the trusses, with mechanical systems hanging from the trusses ... you've got to evacuate the building to do the work."

Detection and abatement. Regardless of who takes the blame for the FRT failures, early detection may help limit the damage. If attics can be cooled or insulated from the heat of the sun, deterioration might be slowed or halted. Reflective roof coverings have been shown to reduce heat gain (*Eight-Penny News*, 12/93), which might help prolong the life of FRT lumber on roofs.

Wood that is deteriorating from the effects of FRT treatments is sometimes discolored. In trusses, experts say, a brown or black color appears near the hot underside of the roof sheathing and slowly moves down across the width of the member. The wood can sometimes be seen to be bowing. Also, sticking an awl or ice pick into suspect wood can reveal the deterioration; affected wood will break across the grain rather than splitting out.

But not all wood turns colors as it gets weak, experts say, and deterioration may be under way before members start to sag. The FPL has found a nondestructive test that they say is 70% to 80% reliable. It involves screwing a screw into the member and applying a force to pull it out. By comparing the withdrawal resistance of the screw to that of a screw in untreated lumber, you can get an idea of the residual strength of installed wood.

For background information on FRT plywood, read the *Home Builders Guide to Fire Retardent Treated Plywood,* published in 1990 by the NAHB National Research Center (400 Prince Georges Blvd., Upper Marlboro, MD 20772; 800/638-8556). □

Starter Homes, Remodeling Look Good in '94

Last year ended with a string of upbeat economic reports, and economists predicted a continuing recovery for 1994. The building industry shared in the comeback. A rise in housing starts and continued strength in the remodeling industry brought 1993 levels of residential construction investment close to the peak levels of the mid-1980s. NAHB economist David Seiders predicted moderate but steady growth in home building and remodeling for the coming year.

Seiders said starter homes will probably sell best in the continuing rebound, because low interest rates are drawing a large group of first-time buyers into the market. The high interest rates and rising home prices of the '80s created a backlog of young families who wanted to buy houses but couldn't afford to; these people are now moving out of rental housing and buying homes. This explains both the strong single-family market and the flat multifamily market, Seiders said. He expects this to be a continuing trend.

NAHB economists also expect "freight-train growth" in remodeling, for similar reasons. Members of the baby-boom generation who already own homes are adding bedrooms or bathrooms and extending kitchens as their families grow and their incomes rise. □

Inmate Builders

BY LAURA REHRMANN

Mike Ammenhauser worked for five months building a one-story, three-bedroom house. Then he watched with pride as it was lowered onto a flatbed truck and squeezed through the narrow, barbed-wire-topped prison gate.

Ammenhauser, serving a 15-year sentence for attempted murder, stayed behind.

The house he and nine other inmates built at Maryland's maximum-security Patuxent Institution will soon be home to a poor family under an innovative state prison program.

"We were able to put our time to work, to help people, and to help ourselves," Ammenhauser said. "We get a sense of pride and accomplishment and a family gets a nice house."

The idea came to Roger Hultgren, a General Accounting Office employee, as he toured the prison while serving on a grand jury. Hultgren noticed inmates working on houses and asked what happened when they were done.

"What they did was they tore the house apart and built the next house a little smaller" until they could no longer use the wood, Hultgren said. "That struck me as being discouraging for people who built the houses, to see them dismantled."

"This is a lot more productive," agrees Dave Todd, who also worked on the modular house and is serving 40 years for assault and attempted rape. "I feel like I'm giving something back to society, plus I'm learning something."

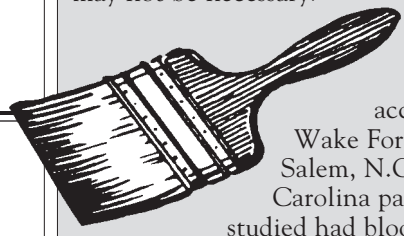
The project is run by State Use Industries, a self-supporting state program that trains inmates in such skills as printing, meat cutting, and making clothes and furniture.

About 10% of inmates in the program end up back in the Maryland prison system within three years, compared with almost half of those in the general population, said Steve Shiloh, general manager of State Use Industries. □

FROM WHAT WE GATHER

Thousands of small contractors will again be able to deduct the cost of home offices from their taxable income if Representatives Peter Hoagland (D-Neb.) and Nancy Johnson (R-Conn.) have their way. Legislation introduced by the two in October would restore the deduction disallowed by a January 12, 1993, Supreme Court decision in the case of Commissioner v. Soliman (*Eight-Penny News*, 3/93). However, Congress's own budget rules require them to find some offsetting spending cut or tax increase, making change difficult.

Crawlspace ventilation requirements in current building codes have no scientific basis. That's the conclusion of research director Bill Rose of the Small Homes Council at the University of Illinois in Champaign-Urbana. After an exhaustive search of the literature, Rose concluded that venting gradually became a code requirement everywhere even though no research established the need for it. In fact, says Rose, several studies have shown that if an effective ground cover is installed in the crawlspace, venting may not be necessary.



Painters did not have excess lead in the blood, according to researchers at Wake Forest University in Winston-Salem, N.C. None of the 127 North Carolina painters who volunteered to be studied had blood lead levels above the OSHA standard of 40 micrograms per deciliter, and all but three were below half of the OSHA standard. Years of experience in painting or time spent repainting or removing paint did not correspond with blood lead levels, the study found.

OSHA referred only five cases to the Justice Department for possible criminal prosecution in 1993, according to Labor Department records. Referrals have been in the single digits for most of the past decade; a high of 16 cases were referred in 1991. By law, the government can file criminal charges in some cases where safety violations lead to a workplace death. It is also a federal crime to lie to OSHA, to give advance warning of an OSHA inspection, or to kill a compliance officer.

Injured workers don't have to take light-duty assignments instead of medical leave under the Family and Medical Leave Act, the Labor department says. However, it is okay for the employer to offer the worker the choice of returning voluntarily to a different work assignment.

Leaky furnace ducts can greatly increase air infiltration into houses, according to data developed by Ecotope Inc. of Seattle, Wash. While examining the overall efficiency of furnace systems in 22 Washington homes, technicians found that when the furnace fan was on, air leakage into the house increased by as much as five times. Washington's Bonneville Power Administration paid for the study, which found that leaky furnace ducts located in unheated crawlspaces can lower a heating system's efficiency by as much as 60 percent.

Shingle Brands Vary in Strength, Test Shows

Reports have circulated for several years that many brands of fiberglass roofing shingles do not meet the ASTM standard for tear strength. The voluntary standard, ASTM D3462, calls for a minimum tear strength of 1,700 grams. New information released by the Midwest Roofing Contractors Assoc. (MRCA) in a December technical bulletin adds substance to these reports. The MRCA bulletin gives the results of tear tests conducted by an independent lab on samples of shingles available in the Chicago area. The results show that most fiberglass shingles tested fell below the ASTM minimum, while all the organic shingles tested (those with a felt mat rather than a fiberglass mat) surpassed the tear standard by a wide margin.

Although the MRCA tests were limited to brands distributed in the Chicago area, sources across the country, including shingle manufacturers and independent laboratories, have reported similar findings in recent years.

Value of test debated. Release of the MRCA bulletin, which identifies shingles by brand name along with their test figures, has revived a controversy over the significance of tear strength. The bulletin says that tear strength is an important indicator because "it measures the toughness of the shingle to resist splitting and tearing action."

Some shingle makers agree that tear strength is a good indicator of shingle durability. CertainTeed Corp., for example, claims that they rely on the tear strength test for quality control and that all their fiberglass shingles exceed the ASTM standard, as confirmed by Underwriters Laboratory (UL) testing.

Others dispute the value of tear strength as a predictor of field performance. Retired Owens-Corning Fiberglass engineer Joe Jones, who chairs a task force investigating premature shingle failure for the Asphalt Roofing Manufacturers Association (ARMA) and the Western States Roofing Contractors Association (WSRCA), said at a recent WSRCA convention that tear strength was not a direct factor in the widely reported shingle splitting problem. Instead, he called for the development of a new standard based on factors including tensile strength and tensile elongation (the ability of shingles to stretch when pulled).

Shingle Tear Strengths

Shingle Type & Manufacturer	Tear Strength
20 Year Fiberglass	
GAF Sentinel	1293
IKO Imperial Glass	1315
Celotex Standard Strip	1370
Tamko Glass Seal	1494
Manville Fire-Glass	1565
OCF Classic	1616
25 Year Fiberglass	
GS Firescreen Plus	1277
Globe 25	1539
Manville Weatherseal	1542
Tamko Elite Glass Seal	1732
OCF Supreme	1793
25 Year Laminated Fiberglass	
Elk Prestique II	1050
Manville Woodland 25	1468
Celotex Dimensional IV	1555
Tamko Heritage II	1638
OCF Oakridge II	1677
30 Year Laminated Fiberglass	
GAF Timberline	1488
20 Year Organic	
CertainTeed Sealdon 20	2390
Globe Seal	2406
IKO Imperial Seal	2675
25 Year Organic	
Tamko Seal Down 25	2496
30 Year Laminated Organic	
CertainTeed Hallmark	3210

MRCA

Figures released by MRCA show a wide variation in shingle tear strengths. Some have questioned the accuracy of the ASTM test, which is done with an Elmendorf tear-tester. But roofer groups are calling for a higher minimum tear standard.

Certain Teed

Elmendorf tear-tester

What to do. MRCA legal counsel James M. Whittier says the association recommends that roofers only use shingles that pass the ASTM standard for tear strength in order to limit their exposure to liability.

This advice limits your choices considerably, at least in Chicago: The table at left, taken from the MRCA bulletin, shows that only two of the fiberglass shingle brands tested exceed the limit, although a number come close.

Many organic choices, on the other hand, exceed the standard handily. The strongest shingle tested overall in the Chicago-area study was the CertainTeed Hallmark organic 30-year shingle, which was nearly twice as strong as the minimum standard. □

New Guidelines for "Hired Guns"

Thirty professional associations have taken aim at expert witnesses who are paid by one side to testify in court — so-called "hired guns." The groups which represent thousands of design professionals have endorsed a document that sets guidelines for such experts. The document, Recommended Practice for Design Professionals Engaged as Experts in The Resolution of Construction Industry Disputes, was developed by an association of soils engineers called ASFE/Professional Firms Practicing in the Geosciences.

John Bachner, executive vice-president of ASFE, an association of soil engineers, said the construction industry is plagued by "court-recognized experts who will say almost anything under oath if the price is right." The Recommended Practices document is now being used to disqualify such witnesses, said Bachner, because it requires them to actually research the issues in dispute in the case, to consider alternative explanations, and to familiarize themselves with the "standard of care" or accepted practice commonly used by professionals in the field in question.

Often in the past, experts have made unfounded assertions about the standard of care in a given profession, basing their statements only on their own opinion or referring to a publication which may not be widely accepted as defining acceptable practice, according to Bachner.

The Recommended Practices document has been endorsed by the American Institute of Architects, the American Society of Civil Engineers, and the American Society of Mechanical Engineers, among others. The document is available for $5 from ASFE, 8811 Colesville Rd., Suite G106, Silver Spring, MD 20910. □