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Retrofitting For Disaster Resistance

Editor's note: No home is 100 percent disaster-proof. Residents in threatened areas should always heed the advice of local emergency personnel.

Hurricane Katrina's devastating impact on the Gulf Coast in late August was followed in quick succession by Hurricane Rita, wildfires in Southern California, flooding in New Jersey, and Hurricane Wilma – disasters that left many homes severely damaged or destroyed. Combined with the tornados and earthquakes that threaten other parts of the country, natural disasters result in great cost and distress to homeowners.

Many homes, whether new or existing, can use advanced technologies to achieve greater resistance to natural disasters, giving them – and their owners – a better chance of surviving and recovering from the next disaster.

For remodelers, many disaster retrofits involve simply replacing existing/standard building products with more durable building materials.

Impact-resistant glazing can help reduce the damage caused by broken windows during storms. Laminated glass uses a plastic interlayer to bond two or more panes of clear glass. For customers with a smaller budget, shatter-resistant film offers a less-expensive alternative that can be applied to existing windows.

When struck with flying debris during a storm, the glass in an impact-resistant window breaks, but is held together by the interlayer or the film. This can reduce water intrusion and help prevent roof lift-off. It also helps protect occupants from injury caused by flying glass.

Unlike shutters or other forms of window protection, impact-resistant glazing is already in place, and does not require installation or any additional effort before a storm.

High-wind and impact-resistant shingles can also minimize the overall damage to a structure during severe weather. The shingles meet the most stringent standards for impact resistance set by the Underwriters Laboratory (UL) and for wind resistance set by UL and the American Society for Testing Materials (ASTM). The shingles help prevent the home's interior from being exposed, which reduces the damage to a home and the risk to occupants.

Several manufacturers use proprietary methods to create asphalt shingles with granules that stay attached to the shingle, keeping the shingles from breaking or detaching.

EcoStar™ offers shingles made from recycled rubber that replicate the look of slate and have a Class 4 impact rating, a Class A fire rating, and a 100-mph wind warranty.

For all shingles, following local building code requirements for fastening the sheathing to the rafters or trusses and the manufacturer's instructions for attaching the roofing is critical. Scrimping on the fasteners may put the home in jeopardy.

In flood-prone areas, mold-resistant wallboard can help minimize damage from water intrusion, including potentially expensive mold remediation. The panels may include a gypsum core that is more resistant to moisture absorption than traditional gypsum. To reduce the mold susceptibility of paper facing, manufacturers may treat the paper on both sides of the gypsum, use glass mat facings instead of paper, or use a gypsum-cellulose combination that does not require paper.

Homes in hurricane-, tornado-, and wildfire-prone areas can benefit from fiber cement siding, which is made from a non-combustible, impact-resistant material composed of cement, sand, and cellulose fiber.

Impact- and wind-resistant shingles, such as Majestic Slate™ by EcoStar, can give homeowners added peace of mind.

The fiber is autoclaved, or cured with pressurized steam, which results in a strong and durable product. It is also an affordable alternative to wood and stucco siding and is resistant to rot and insects.

Remodeler John Macko of Macko Construction in Kill Devil Hills, N.C.,

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Alternative Wall Insulation Methods

During the recent debate over new, stricter insulation requirements, the NAHB Research Center was flooded with inquiries about alternatives to traditional fiberglass batt insulation, which currently represents 80 percent of the national market. Although higher insulation levels will not be required in the 2006 IECC, the Research Center continues to receive calls from builders interested in how insulation alternatives can provide comfort and energy savings to their homebuyers.

Several time-tested and code-accepted insulation options exist. These alternatives offer various advantages and can often directly replace fiberglass batts with little additional preparation.

Sprayed foam is an easily-installed and energy-efficient alternative insulation. Liquid foam is sprayed into vertical wall cavities, where it expands into a solid, cellular foam that fills every nook and cranny, providing an air-tight seal. Some high-density spray foams can have nearly twice the R-value per inch of traditional batt. Sprayed foam does not change shape or biodegrade over time, and generally consists of inert materials that, once applied, are safe to handle and do not compromise indoor air quality.

Sprayed fiber insulation may consist of damp cellulose, fiberglass or mineral wool sprayed into wall cavities. Like sprayed foam, sprayed fiber insulation completely fills the area, providing a continuous R-value. This method is easy to use, provided that the contractor monitors the material's water content and delays applying drywall until the insulation has sufficiently dried, usually about 24 hours.

Insulation can also be blown in through a membrane, a method similar to the blown-in cellulose or fiberglass typically used in attics. Insulation is blown into a wall cavity that has been closed in with a membrane (generally nylon netting or polyethylene). The result is an easily-installed, energy-efficient insulation that is non-toxic, vermin-proof, and fireproof. The R-value can vary from 3.6 to 4.2 per inch, depending on the density. This will allow up to an R-15 in 2x4 walls and beyond R-21 in a 2x6 wall.

Non-fiberglass batts may include several materials that offer a variety of benefits. Cotton batts, which are available in 3.5" R-13 or 5.5" R-19 thicknesses, use 75 percent post-production recycled material and are completely recyclable at the end of their useable life. Sheep's wool is a natural, sustainable product that can be treated to resist pests, fire, and mold. Mineral wool can provide better acoustical absorption than fiberglass, and is fire- and heat-resistant.

Wall systems, such as insulating concrete forms (ICFs) and structural insulated panels (SIPs), offer high R-values and significant energy savings by taking an alternative approach to the home's entire wall system.

ICF walls use polyurethane or polystyrene foam forms with voids filled with concrete and reinforcement. They provide R-values between R-17 and R-26. SIPs are made from a thick layer of polystyrene or polyurethane foam sandwiched between two layers of oriented strand board (OSB), plywood, or fiber cement. A recent study by Oak Ridge National Laboratory (ORNL) showed that a 4-inch SIP wall rated R-15 outperformed a 6-inch fiberglass insulated wall rated R-19. Both SIPs and ICFs can also be easier and faster to install, and designed to resist high wind loads, moisture, and rot.

For more information on any of these alternative insulation materials, or other innovative and advanced building products and processes, visit the PATH Technology Inventory on ToolBase.org. TB

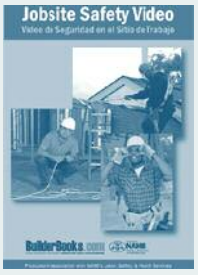
RESOURCE REVIEW

Make Your Jobsite a Safe Place for Workers

Implementing a written jobsite safety program prevents injuries, saves lives, and safeguards employees, trade contractors, and clients from avoidable hazards. An effective safety program also protects your business and improves the bottom line by reducing liability, a valuable benefit that can lead to discounted insurance premiums (see Quality Matters article in this issue of *ToolBase News* for more information). During the busy construction season, work crews often have too little time to attend needed safety training which can result in the unfortunate occurrence of jobsite mishaps. Now, the National Association of Home Builders (NAHB) has made it easier for building professionals to focus on jobsite safety by developing the industry's first ever English-Spanish jobsite safety orientation video.

Based on the NAHB-OSHA Jobsite Safety Handbook, the orientation consists of two 20-minute videos on DVD. One in English and the other in Spanish, the set provides an overview of the key safety issues residential builders and workers need to focus on to reduce accidents and injuries. The video covers practical information on a number of jobsite hazards, however it is not intended to be used as a stand-alone resource, rather as part of an essential residential construction safety training program. Topics covered in the video include:

- Personal Protective Equipment
- Lifting Safety
- Scaffolding
- Trenching and Excavation
- Vehicles/Mobile Equipment
- Fire Prevention
- Housekeeping
- Stairways and Ladders
- Fall Protection
- Tools and Equipment
- Electrical Safety
- Hazard Communication



With the introduction of this new resource, members of the building community have a reliable business solution at their fingertips. Statistics from the Home Builders Institute's Safety and Security course reveal that on average, builders with an effective written jobsite safety program have 36 percent lower jobsite accident rates. Taking an active role in developing and supporting a company-wide safety program is the first step toward improving performance, and can lead to additional benefits such as discounted insurance rates. A written handbook in English and Spanish also accompanies the Jobsite Safety Video, which is available from NAHB through BuilderBooks.com.

Don't Miss Us at the International Builders' Show

If you are interested in innovative building products, practices, systems, and technologies that help to improve the affordability, durability, energy-efficiency, environmental performance, and safety of the homes you build, then be sure to check out all the PATH (Partnership for Advancing Technology in Housing) exhibits and happenings at the 2006 International Builders' Show – January 11-14, 2006, Orlando, Fla., Orange County Convention Center.

Exhibits:

- Visit the **PATH Booth**, **#W4371**, to see a display and demonstrations of some advanced building technologies, pick up a CD with the latest PATH resources, and find out the benefits of becoming a PATH Partner.
- You can also visit the **ToolBase Services Booth**, **#D5** (located in West Building, Hall D Lobby), to find out more about the new and improved PATH Technology Inventory – the online listing of over 170 innovative technologies – including the new CAD details that are now available for many of those technologies.
- Both the PATH and ToolBase booths will feature information on the PATH Tech Sets – technologies that work best when they are used together – including Resource-Efficient Plumbing, Durable and Efficient Building Envelope, Energy-Efficient Lighting, and the yet-to-be-released Tech Set #5 (will be unveiled during the Show).

Demonstration Home:

- PATH is sponsoring the **2006 NextGen "Peace of Mind" Demonstration Home**, which will be located in parking lot D, behind the West Building on Convention Way.
- The home, which will feature more than 15 technologies from the PATH

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QUALITY MATTERS

Can Quality Assurance Impact General Liability Insurance?

If you're having trouble finding or affording adequate liability insurance, you are not alone. In recent years, average annual insurance premium costs for builders, trade contractors, and design professionals have increased exponentially. Since companies in this industry need liability insurance to stay in business, building professionals must take a proactive approach and accentuate the positive.

An effective way to mitigate the increased cost of general liability insurance is to illustrate exactly how your company minimizes the risk of defect lawsuits and claims of poor workmanship and improperly installed products, materials, and equipment. The first step is to educate your agent about your quality management system and the reduced risk of insuring your company. Provide a copy of your documented quality assurance plan. If the insurance agent doesn't understand the value of your plan, the next step is to seek an opportunity to explain it to the broker or even to a representative of the insurance company itself.

As the customer seeking a discounted rate, you may be faced with educating not only your agent, but in some cases, each level above them. Presenting a compelling argument can work in your favor. Consider the following talking points when heading to the negotiation table:

- Your personnel understand and comply with applicable industry codes and regulations.
- Your personnel re-inspect and document the correction of all identified non-conformances with your quality system.
- Your company has an integrated and effective jobsite safety program for all projects.
- Each crew member follows product installation instructions.
- You have an effective and continuous improvement program to eliminate recurring errors from your construction process.
- You have the documentation to prove all of these points and you keep your records in an accessible and safe location for at least 10 years.

Marsh USA, the largest construction industry insurance broker in the country, is working closely with the NAHB Research Center to increase the number of companies in the residential liability industry and to expand policy options for home builders and their trade partners. There are strong indications that more widespread use by builders and trades of well-documented quality assurance programs that include regular training of jobsite personnel and a focus on continuous improvement can do just that.

In some states, insurance companies have taken notice of the building industry's efforts to lower risks and improve quality by passing the savings on to consumers whose homes meet specific criteria. Enhanced quality, durability, and performance, as well as adherence to building codes and disaster mitigation features, are just a few attributes that are making a difference.

With such high stakes, many insurance companies have begun requiring an audit of their customers to determine the appropriate risk level for policies. So, if your company doesn't have a fully-documented, systematic program for quality assurance in place, gaining ground will be difficult. To administer an effective plan, consider participating in a program like the National Housing Quality (NHQ) Program. Objective, third-party verification of quality management practices is another compelling selling point for reduced premiums.

Remember, if insurers can proceed with "business as usual" and require higher premiums, they will. Make them work for your business and understand what you are doing to reduce their risk. For more information on leveraging your quality management system with your insurance agent, and a list of companies offering discounted CGL insurance to builders who meet specific criteria, visit the National Housing Quality Program pages at www.nahbrc.org/quality or contact Don Carr, NHQ Builder program manager at dcarr@nahbrc.org.

Going Solar – Highlights from the 2005 Solar Decathlon

If ever there was a test for solar technologies, this year's Solar Decathlon, sponsored by the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy, was it. Eighteen teams of university students from around the globe came to Washington, D.C. for a week in October to build a solar village comprising their energy-efficient, solar-powered homes, which many teams worked on for years – and it was rainy and overcast almost every day of the competition!

But the houses stood up to the challenge posed by the weather, and the judges. Teams were allowed to use only energy from the sun to power their competition homes to perform all the typical functions of a home – washing clothes, cleaning dishes, powering computers, and maintaining a comfortable temperature. The solar homes were judged on their performance in 10 different contests focused on energy, including the home's architecture, livability, comfort zones, ability to charge an electric car, and the team's ability to communicate their strategies to the general public.

This year's winning team, the University of Colorado, Denver and Boulder, had a balanced all-around approach and took first place in the Communication and Documentation contests, as well as the Getting Around contest with their electric vehicle. The Communication contest challenged the team to communicate experiences and technologies through websites and home tours for visitors. The Documentation contest required the house to be constructed using a whole-house design, with all of its components designed to work together to produce better energy performance. In the Getting Around contest, teams use electricity generated by their solar systems to power street-legal, commercially available electric vehicles, and must log as many miles as they can using the "extra" energy they have generated. Having spare energy to fuel their vehicle was one of Colorado's biggest challenges in that dreary environment.

Many of the materials the University of Colorado team used to build their home can be found in any natural food store – soy beans, corn, sunflower, canola, and coconut. Using these natural resources and developing its own spin on structural insulated panels (SIPs), the team defended its championship from the last Solar Decathlon. The "BIO-SIP" featured two panels of Sonoboard (a lightweight board made from recycled materials) filled with BioBase 501 (a foam insulation made from soybean oil). But Colorado wasn't the only team in the competition to impress the judges.

Cornell University, the second-place overall winner, coupled an energy recovery ventilator (ERV) with an electric heat pump and an air handler, and was able to provide heating and cooling and transfer it between the home's airstreams. California Polytechnic State University, the third-place team, went with what they determined to be a more user-friendly approach and didn't automate the home. In the Getting Around contest, they went as far as they could with the electric car, then biked the rest of the way so that the energy could be used strictly for the home and its processes.

These innovative practices and technologies, along with solar chimneys, roof-mounted photovoltaic (PV) systems, and low-emissivity (low-e) windows, are featured in a Solar Decathlon Product Directory. Additional information about innovative and energy-efficient technologies is available on the PATH Technology Inventory – visit www.ToolBase.org.

Find out more about this year's Solar Decathlon by visiting the U.S. Department of Energy's Office of Energy Efficiency and Renewable Energy's website at www.eere.energy.gov/solar_decathlon. TB

Retrofitting (continued from page 1)

originally started using fiber cement siding 11 years ago for its durability. "I'm in a coastal region and we have a lot of moisture and termite issues here," said Macko.

However, after Hurricane Isabel, Macko saw plenty of vinyl siding that had been blown off of homes in the Outer Banks area, whereas not a single piece of fiber cement siding had come off of any of his projects.

According to Macko, the transition to fiber cement siding is an easy one. "It's a little more difficult than installing vinyl siding, but then we're not comparing apples to apples," he said.

Prefabricated storm shelters are an affordable and effective form of protection for homeowners living in areas prone to tornados. The shelters are generally small and low to the ground, measuring about 6'x8'x6' and are constructed to resist high winds and projectile impacts. Shelters may be constructed from fiberglass or concrete. Because many of the injuries or deaths from hurricanes occur as a result of flooding, evacuation is better than an in-place shelter.

In-ground fiberglass shelters require an 8'x10'x90" excavation with an 8" concrete slab, where it is chained down and backfilled. Concrete shelters can be installed on flat or hilly terrain, where they are placed into the finished grade. The 13,000-pound unit is lifted into place on top of a sand and gravel base. Because of its weight, no additional anchoring is necessary.

According to Kenny Crouse, owner of Canton Enterprises, a manufacturer of precast concrete storm shelters in Canton, Kan., prefabricated storm shelters are easier and less expensive to install than shelters that are built on site. "You can be done in half a day," Crouse said. Canton's shelters also require little maintenance. "Once the concrete is in the ground, all you have to do is paint the door occasionally," he explained.

For more information on new disaster-resistant building and remodeling technologies, visit the PATH Technology Inventory on ToolBase.org. TB

International Builders' Show (continued from page 3)

Technology Inventory, will be built by Brownstone Builders & Associates, Landenberg, Pa.

Educational Sessions:

- January 12, 2006, 4-5:30 p.m., **"Construction Technologies on the Web: Finding the Best Sources"**
- January 13, 2006, 4-5 p.m., **"Selling Consumers on Advanced Technology: Tools for Builders"**
- January 14, 2006, 11 a.m.-12 p.m., **"The Durable Building Envelope"**

If you can't make it to Orlando for the International Builders' Show, you can always find out more about how PATH is working to improve home building by visiting the PATH website at www.pathnet.org. To find out more about the technologies that PATH has identified as having the potential to make home building more affordable, durable, and efficient, and the field evaluations where those technologies have been put to the test, visit the ToolBase website at www.ToolBase.org. TB