technology scanning

Building Envelope Technologies

This category includes technologies which relate to the structure, assembly of, protection of, or thermal efficiency of the exterior building envelope. Technologies outlined here relate to wall panels, roof and floor systems, and insulation applications. Some technologies outlined here are creative thinking about the exterior building shell and its function of protecting the occupants.

Technology Scanning

One of PATH's major research support services is PATH Technology Scanning. *Technology Scanning* tells us about technology developments in other industries, from other nations, from federal laboratories, and from other building sectors. PATH looks for breakthroughs in other industries that could be transferred and applied to housing. *Technology Scanning*–published by the U.S. Department of Housing and Urban Development/PATH and prepared by the NAHB Research Center–is updated as technology developments dictate. The Research Center works to unite technology developers from outside of residential construction with manufacturers in the residential housing sector.

This issue of *Technology Scanning* is one in a series. Each issue in the series falls into one of the following categories:

- *Design and Internet Tools*
- *Safety*
- *Surfaces and Interior Finishes*
- *Building Envelope Technologies*
- *Electrical*
- *Plumbing*
- *Heating, Ventilating and Air Conditioning*
- *Energy/Power Systems Generation*
- *Basic Materials*
- *Information Technology*
- *Sustainable Design Strategies*
- *Materials Recycling and Reuse*
- *Thermal and Moisture Protection*
- *Indoor Environmental Quality*

Call the ToolBase Hotline at 800-898-2842 for information about other available *Technology Scanning* issues. Or, log onto www.pathnet.org and www.toolbase.org.

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Structure/Frame/Panelized

Structure Research Focuses on Withstanding the "Big One"

Researchers at the University of Minnesota Civil Engineering Department are conducting a three-year study, funded in part by the NSF (National Science Foundation) and the American Institute of Steel Construction, that looks at girder-to-column connections in structures in earthquake prone areas. The larger design community will consider the research for incorporation into building codes. The Minnesota researchers are also conducting a study aimed at improving the construction of traditional steel buildings without necessarily changing the materials used but rather how the material is manipulated.

Composite designs of concrete and steel used in combination can result in more cost effective safer designs. One such design being tested looks at concrete filled steel tubes (CFTs) as main columns in buildings. Joint research by the United States and Japan has shown these designs to successfully withstand quakes in the recent Japan earthquakes. Many of these findings and design improvements could be looked at for potential application in part or whole to residential structures. The connections simplified but using similar principles, the composite columns used for support of structure in residential uses.

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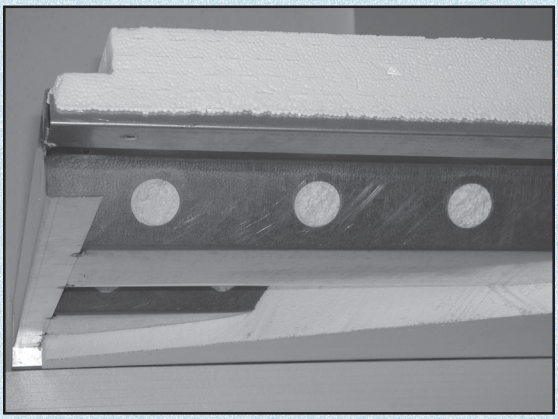
Insulated Metal Structural Panels

From the steel building sector come insulated metal core panels that speed construction while providing versatile exterior finish choices. The ACSYS Inc. panel system can be used for structural foundations, wall, roof, and floor or exterior cosmetic panels. The insulated panels can accept any interior or exterior finish (stucco, EIFS, brick, stone, FRP, plywood, gypsum). The heart of the panel is a galvanized structural steel core, embedded in a body of expanded polystyrene. The system works extremely well in conjunction with steel framed buildings virtually eliminating thermal issues often associated with such buildings.



Courtesy: ACSYS Inc.

Panel cutaway view.

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Innovative Finishing Technology for Wood

The market for semi-transparent stain and wood protection is growing at faster rate than paint, causing a worldwide demand for high performance wood finishes. The log home industry is one of the biggest users of semi-transparent finishes because it brings out the natural look of wood. Perma-Chink Systems, Inc., one of the premier finish providers in the log home industry, has developed a high performance, water-borne, polymer wood finish called LIFELINE ULTRA-1.

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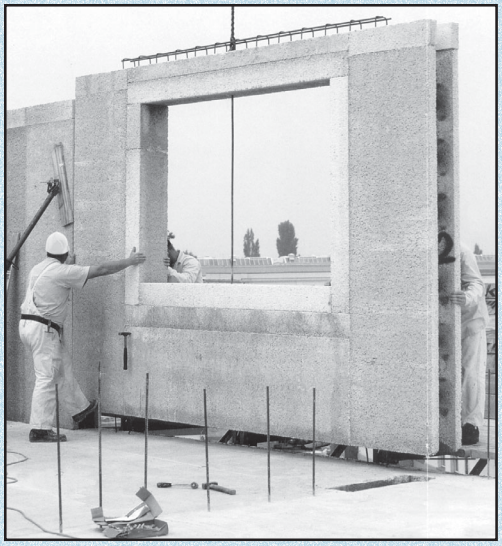
Innovative Finishing Technology for Wood, continued

The new generation of high performance finishes protects the wood from UV damaging rays but allows light to pass through to showcase the natural look of wood. The technology, developed around film thickness, concentration levels, and ultra-fine particle size of pigment, uses new transparent iron oxides with greater permanency and transparent clarity. The particle size and shape effectively block UV rays, but allow visible light to pass through, similar to the principles behind metallic coatings on low-e window glass. The polymer technology utilized to support the pigment particles provides the flexibility to allow the film to breathe and move with the wood's expansion and contraction rates and moisture changes.

The advanced polymer film is water-borne so harmful VOCs and odors are eliminated, making it more environmentally sound to produce and safer to apply. The new transparent finish has specialized fungus and mold inhibitors as well, for long lasting protection. The finish currently is introduced in seven semi-transparent colors. Distributors are in Colorado, Montana, Minnesota, Tennessee, Washington, and New England. It is priced around $42/gallon with coverage rates of 300-350 sq ft/gallon.

Contact:
Perma-Chink Systems, Inc.
800 Industrial Drive, #205
Sauk Rapids, MN 56379
Phone: 320-240-9302 or 877-244-6548
Fax: 320-240-9307
www.permachink.com

Courtesy: Rastra America



Rastra®–Environmentally Friendly Building Panel.

Carbon Foams

Carbon foams, being developed by Touchstone Research Laboratory, are a unique, new next-generation structural material. Carbon foam is inexpensive, lightweight, fire-resistant, impact absorbing, and can be thermally insulating. Its properties are configurable to the desired application. It can be fabricated in a variety of shapes, sizes, and densities. The foam does not off-gas nor does it support ignition. Its properties do not deteriorate with higher temperatures. Carbon foams can be bonded to dissimilar materials. The material is currently in development and final test stages and has application prospects in structural panels and firewalls for automotive, shipping, aircraft, and military. With its property characteristics, it may be a good candidate material for hybrid composite wall panels for houses.

Contact:
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The Millennium Centre
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Phone: 304- 547-5800
Fax: 304- 547-4069
www.cfoam.com or www.trl.com

Environmentally Friendly Building Envelope System

Rastra® is a new environmentally friendly building system developed in Switzerland. Similar to ICF systems, it is made from a mixture of cement, water, and recycled plastic foam. It is made in two basic forms or shapes, a standard element and an end element. Entire exterior walls can be assembled including headers for openings. The pre-made elements are lightweight with workability better than wood. Wall thickness from 8-14 inches can be achieved. It has been fire tested to five hours with no flame spread or combustion. Its high thermal properties give unsurpassed insulating qualities along with superior vapor transmission properties. It can accept vertical and horizontal rebar and is filled with concrete for hurricane and seismic loads. Rastra® can be assembled on site in building block form or pre-assembled in factories into wall panels up to 25 feet long. It is ICBO certified and has an SBCCI and UL number as well. This product is now available in the U.S. market imported from Mexico.

Exterior Surfaces

Metal Panels Look Like Shingle Roofing

Several companies now offer metal roofing panels that look like shingle roofs from the street. They use colored stone coatings embedded in UV resistant polymer resin bonded to a steel substrate. The panels install faster than shingles and last longer. For example, Metro Products roof panels carry a 50-year product warranty, a 25-year appearance warranty, 120 mph wind warranty, and a hail stone impact warranty.

Contact:
Metro Roof Products
Oceanside, CA 92054
Phone: 760-435-9842
www.smartroofs.com

Gerard Roofing Technologies
Brea, CA 92821
Phone: 800-237-6637
www.guardianshingle.com

Decra Shingle
Corona, CA
Phone: 909-272-8180
www.decra.com

Low Cost Alternative to Slate

Eternit Thrutone Slates are an innovative, affordable alternative to slate surfaces. Used in roofing today, these manmade tiles have color through to the core. The base material is fiber-cement with color and texture added under high pressure. The product is warranted for 50 years.

Contact:
Eternit, Inc.
610 Corporate Drive
Reading, PA 19605
Phone: 800-233-3155
Fax: 610-962-9232
www.eternit.co.uk

Stone-Look Metal Coping

Metal-Era introduced the first stone-looking metal coping for exterior trim detail (wall parapets). It provides a realistic stone appearance at a fraction of the cost of natural stone. Kynar 500/ Hylar 5000 coatings provide long life finish. Further realistic details include splice joints in four-foot sections that mimic tooled mortar joints.

Contact:
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