Environmental Building News™
The Leading Newsletter on Environmentally Responsible Design & Construction
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Polished Concrete Outshines Other Flooring Options

THE LONGER I RESEARCH GREEN building practices, the more I appreciate innovations that are not just functional and environmentally responsible, but also cost-effective. Such is the case with polished, densified (hardened) concrete flooring. Stone polishing techniques from Europe, coupled with mineralizing chemical treatments developed in the U.S., are allowing us to turn one of the oldest materials in building—concrete—into one of the newest, greenest, and most affordable flooring options available.

This article examines the relatively new practice of grinding and polishing a concrete slab floor (new or existing) to a high sheen in a process that also involves hardening the material using silicates or related compounds. Used primarily in schools, warehouses, big-box retail stores, and industrial buildings, this practice also applies to commercial office buildings and even homes.

Photo: RetroPlate

Polished, densified concrete, such as this installation at the Benjamin Franklin Elementary School in Kirkland, Washington, offers a highly durable, low-maintenance flooring option for schools and other buildings.

Background

Because polished-concrete floors look a lot like terrazzo, one might assume that the system evolved from terrazzo; it did not. The polished, densified concrete floors described in this article were developed in 1996 when Advanced Floor Products, Inc. (known primarily by its brand name RetroPlate™) of Springville, Utah, combined its sodium silicate chemical expertise with diamond stone-polishing technology pioneered in Europe in the early 1990s. The company's system has now been used to treat 100 million ft² (9.3 million m²) of concrete floor.

Several similar systems are on the market, including FGS® PermaShine from L&M Construction Chemicals, Inc., and CertiShine™ from Vexcon Chemicals, Inc. Each of these systems has its own proprietary chemicals and application procedures. HTC Sweden AB, represented here by HTC-America, pioneered concrete polishing in Europe in 1992 and is the leading supplier of grinding and polishing equipment; it maintains a sales staff to support practitioners with information on concrete polishing, including its own HTC Superfloor™ system (which does not include densifying).

Polished, densified concrete flooring provides a significantly better alternative to film and wax coatings on concrete floors. Both epoxy and moisture-cured polyurethane film coatings have been used on concrete slab floors for a number of dec-

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In This Issue

Quote of the month:

"We are just now scratching the surface in learning how these structures—commercial and residential—really affect us as human beings."

USGBC CEO Rick Fedrizzi

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What's Happening

California Adopts Massive Solar Energy Program

The California Public Utilities Commission (PUC) approved the California Solar Initiative, the largest solar energy program in the history of the U.S., in January 2006. The initiative will provide $2.9 billion in incentives through 2017 for solar systems in the state. The result is expected to be 3,000 MW of solar power spread across one million California rooftops. "We're confident this will bring solar from a fringe industry into the mainstream," says Dian Grueneich, one of the five PUC commissioners.

Effective January 1, 2006, the PUC will pay $2.80 per watt of installed capacity for photovoltaic systems—about one-third the total cost for a typical residential system. This amount will decrease by about 10% each year. The PUC also plans to provide incentives for solar-thermal-electric and solar-hot-water systems, though the funding level for these systems has not been determined. Ten percent of the program funds are earmarked for low-income housing. The PUC will pay for the incentives by charging an average $1.12 per customer through monthly electricity and gas bills. This charge, set to decrease over coming years, will be largely offset by the expiration of a surcharge that funded energy deregulation.

Drawn largely from Governor Schwarzenegger's Million Solar Roofs Initiative, which died in state legislature last year (see *EBN* Vol. 14, No. 10), the California Solar Initiative thrills environmentalists. "This is something that we can't afford not to do," says Adam Browning of the Vote Solar Initiative. "A program of this size is what's needed to build the economies of scale necessary to bring solar into the mainstream—and provides hope in the fight against global warming." *– JB*

For more information:
California Public Utilities Commission
www.cpuc.ca.gov

USGBC Forms Research Committee

On January 4, 2006, the Executive Committee of the U.S. Green Building Council (USGBC) board of directors approved the charter of a Research Committee and appointed its initial five members. This is a core *organizational* committee of the Council (as opposed to being a LEED® committee) that focuses on one of the USGBC's six key goals in its 2004 Strategic Plan: "The USGBC will be both a resource for existing knowledge about the built environment and a driver of relevant research." To achieve this goal, the Research Committee charter includes seven key objectives:

BuildingGreen Seeks Writer/Editor

Are you an experienced writer/editor with green building knowledge and excellent research skills? Do you have a knack for distinguishing meaningful information from hype? If so, you might consider joining the editorial team at BuildingGreen, Inc. We need to add a writer to our staff to keep up with our publishing schedule and commitments. The right person will be highly organized, familiar with commercial and residential construction, a good communicator (both verbally and in writing), and able to work both independently and in teams. The position is based in our Brattleboro, Vermont, office, so unless you're already nearby you must be willing to relocate. Salary will be determined based on your level of experience. Please send a résumé, a cover letter, and writing samples to jobs@BuildingGreen.com no later than February 28, 2006.

- Develop strategies for effective dissemination of existing research relevant to the greening of the built environment.
- Identify and regularly reassess critical research needs for market transformation in greening the built environment.
- Catalyze fundamental and applied research related to sustainability of the built environment.
- Strengthen the commitment to conduct and fund green building research—among government, foundation, academic, nonprofit, and corporate entities.
- Support the establishment of a scientifically robust basis for future versions of the LEED Rating System.
- Support development of robust, internationally based benchmarking methodologies relating to building performance (energy, indoor environmental quality, environmental impacts, human productivity, etc.).
- Support the integrity of other USGBC programs and activities relating to research and the underlying basis of green building.

The Research Committee's initial five members are Richard Haut, Ph.D., of the Houston Advanced Research Center; Bruce Hunn, Ph.D., of ASHRAE; Vivian Loftness, FAIA, of Carnegie Mellon University; Steve Selkowitz, Ph.D., of the Lawrence Berkeley National Laboratory; and Alex Wilson of BuildingGreen, Inc. "The formal creation of the Research Committee is long overdue and could be one of the most important contributions the USGBC makes to the *complete* adoption of green building design strategies throughout the built environment," says founding chairman and CEO Rick Fedrizzi. Fedrizzi is particularly excited about the relationship between buildings and human health and productivity—and the importance of research in advancing our understanding of these issues. "We are just now scratching the surface in learning how these structures—commercial and residential—really affect us as human beings," he told *EBN*.

The next step with the Committee will be the election of six additional members from the ranks of the Corresponding Research Committee of the Council. "Anyone with interest in serving on the core Research Committee or keeping up with research issues within the Council should sign up to be on the Corresponding Committee," says Alex Wilson, who as a board member spearheaded the formation of the Research Committee with Vivian Loftness. A two-day retreat to address research priorities for the green building community is planned for later this year. The Council's 2006 Ginsberg Fellow, Mara Baum, who recently completed dual graduate degrees in architecture and city planning at the University of California at Berkeley, will be working with the Research Committee on this Research Priorities Summit and a white paper as the outcome of that meeting. *– NM*

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USGBC members can join the Research Corresponding Committee via their account management screen.

AIA, BuildingGreen Ink Deal

To help its 77,000 members meet their green design information needs, The American Institute of Architects (AIA) has signed an agreement with BuildingGreen, Inc. The agreement will bring *Environmental Building News* (*EBN*) articles to AIA members through AIA Knowledge Community publications, including *AIArchitect,* and through AIA's website, www.aia.org. The agreement also provides AIA members with an immediate 30% discount on new and renewing individual subscriptions to the BuildingGreen Suite of online resources, which includes 14 years of *EBN* articles, more than 2,000 *GreenSpec*® product listings, and more than 135 high-performance building case studies, all cross-referenced and searchable by CSI MasterFormat™ section, LEED® credit, and green topic.

BuildingGreen will work with AIA on several fronts, bringing important articles and research directly to AIA members, implementing distance-learning initiatives, and providing continuing education credits for architects acquiring knowledge through BuildingGreen publications. "Information on sustainable design and building products is of growing interest to AIA members," says Phil Simon, AIA's managing director for marketing and promotion. "This agreement with BuildingGreen allows us to offer our members streamlined access to critical information at a reduced cost." *– JB*

California Builders Pay for Degrading Air Quality

Beginning March 1, 2006, builders in California's Central Valley will be forced to either reduce the smog and particulate matter their projects generate or help finance projects that improve the region's air quality. The program, believed to be the first of its kind, applies to the eight, largely agricultural, counties regulated by the San Joaquin Valley Air Pollution Control District.

The Central Valley's climate, topography, and population make it vulnerable to air pollution by particulate matter and ground-level ozone, or smog; as a result, the region rivals Los Angeles and Houston for the country's worst air quality, according to the U.S. Environmental Protection Agency. "Despite years of improved air quality in the San Joaquin Valley, the air basin still fails to meet state

and federal health-based standards," says the Air District. "Therefore, the Air District is required by federal law to adopt the most stringent control measures available to reduce emissions."

The Indirect Source Review rule (number 9510), approved in December 2005, is aimed not at the pollution that new development causes directly, but at the *indirect* pollution resulting from activities such as construction, lawn care, and especially driving. (For more on the environmental and health impacts of sprawl, see *EBN* Vol. 11, No. 4). The rule applies to new developments that are "expected to create a significant amount of air pollution," including residential developments of 50 or more units, commercial buildings that are 2,000 ft^2 (186 m^2) or larger, industrial or education buildings that are 25,000 ft^2 (2,323 m^2) or larger, and office buildings that are 50,000 ft^2 (4,645 m^2) or larger.

The rule requires developers to reduce nitrogen oxide (NOx) emissions by a third and particulate emissions (PM10) by half, compared to baseline development. A developer can achieve this in myriad ways, ranging from increasing the development density or increasing energy efficiency to installing sidewalks or not installing woodstoves. Projects that fail to meet the required reductions will be forced to fund offsite air-quality improvement projects, such as bicycle and public transit infrastructure. These projects will be selected and managed by the Air District, which is charging $4,650 per ton of NOx reductions and $2,907 per ton of PM10 reductions in 2006. For a typical housing development that includes no onsite mitigation measures, the developer would pay about $780 per home, according to Air District estimates. Fees will rise considerably in 2007 and beyond.

Critics of the program include the California Business Properties Association, which represents the state's commercial, retail, and industrial real-estate industry. Critics believe the rule unfairly targets new development as opposed to all residents, that the Air District should be targeting vehicle emissions more directly, and that the Air District models (using URBEMIS software) overestimate indirect emissions caused by new development by up to 70%. The rule will be reevaluated in 2010. *– JB*

For more information:

San Joaquin Valley Air Pollution Control District
Fresno, California
559-230-6000, 559-230-6061 (fax)
www.valleyair.org

California Business Properties Association
Sacramento, California
916-443-4676, 916-443-0938 (fax)
www.cbpa.com

News on the Toilet Testing Front

Since we carried our in-depth report on toilets in January 2004 (*EBN* Vol. 13, No. 1), quite a bit has happened in the area of standardized testing of toilet performance. The Maximum Performance (MaP™) testing that we reported on has been progressing at a rapid pace. Veritec Consulting, Inc., has now tested well over 200 toilet models, and the increasing use of this performance standard for toilet specification (including in our *GreenSpec® Directory*) has pushed manufacturers to have their products tested.

One consequence of this demand for MaP testing has been a modest redesign of the MaP testing protocol. In late 2005, Veritec modified its soybean-paste test media. Until then, Veritec had extruded the material into cylinders that had density and dimensions very similar to the human waste it was modeling. According to John Koeller, P.E., of Koeller and Company in Yorba Linda, California, who with William Gauley, P.Eng., of Veritec developed the MaP testing protocol, the problem was that Veritec was going through a whole lot of this material—which was essentially food-grade miso (they were calling it "non-food-grade soybean paste" and were contractually prevented from referring to it as miso). The test media could be used only once, and in 2005 Veritec used 414 20-kg containers (over 18,000 pounds) of the material, requiring as much as 3 kg (7 lbs) to test a single toilet. Veritec had become Canada's single largest importer of miso! "We were in jeopardy of losing our sources," says Koeller, who notes that miso suppliers have never liked their product associated with toilet testing. "We came to the conclusion that there might be a better way," he told *EBN*.

After much experimentation, Gauley came up with test media in which the soy paste is encased in latex sleeves (non-lubricated condoms, if you must know—see photo). Gauley estimates that the encased test media can be reused 50 to 100 times. Veritec ran extensive tests comparing the MaP flush performance with and

The newly encased testing media (see inset) for the MaP toilet testing protocol are reusable and leave the water clean enough to reuse too, dramatically reducing the amount of soybean paste and water needed to test each model. Photo: John Koeller, P.E.

without the casing. "The results were spot-on," according to Koeller, "no difference at all."

The other major development with toilet testing was the launch of "Uniform North American Requirements (UNAR) for Toilet Fixtures" in January 2006. Representatives of some of the largest North American water providers met in January 2004 to discuss the development of uniform requirements for toilets that are subsidized through water conservation programs. UNAR grew out of this effort.

As envisioned by the lead developers, Koeller and Gauley, UNAR is a *voluntary* qualification system that can be adopted by water authorities who want to ensure both that toilet fixture replacements achieve water savings that persist over time and that customers are satisfied with toilet flush performance. UNAR incorporates both the MaP testing, setting a minimum performance of 250 grams, and the Los Angeles Supplementary Purchase Specification (SPS), which ensures that water consumption will not increase when toilet flappers are replaced and that toilets cannot be modified to raise their water consumption above a prescribed level—currently 2.0 gallons (7.6 l) per flush. (Currently plumbing contractors, facility managers, or homeowners can modify many 1.6-gpf (6.0-lpf) toilets to as much as double water consumption.)

Included in UNAR is the definition of a high-efficiency toilet (HET) that several water utilities in California have been using for a couple of years. The UNAR standard defines a HET as a toilet fixture that flushes at 20% below the 1.6-gpf (6.0-lpf) maximum or better. Thus, the maximum flush volume for a HET is 1.28 gallons (4.8 liters). In 2005 BuildingGreen adopted this HET standard, as well as flush performance based on MaP testing, for toilet approvals in our *GreenSpec Directory*.

Several developments are on the horizon for UNAR. Over time, the UNAR standard for toilets may be expanded to include other performance factors such as bowl wash and noise. Koeller and Gauley are also working on a UNAR standard for urinals, which will probably include a definition of high-efficiency urinals as those that use less than a quart of water per flush (0.25 gpf or 0.95 lpf). While Koeller and Gauley envisioned the UNAR standards as voluntary, Koeller told *EBN* that some in the U.S. plumbing industry would like to see it adopted as a national, mandatory standard. – *AW*

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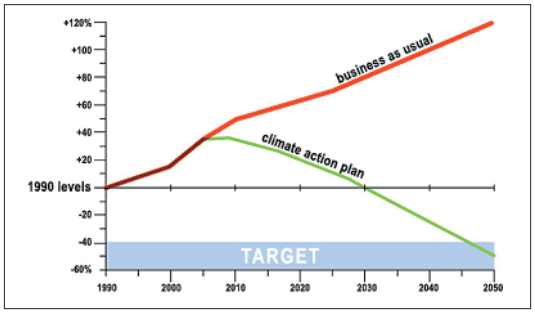
California Urban Water Conservation Council
Sacramento, California
916-552-5885
www.cuwcc.org/MaPTesting.lasso
(for latest MaP report)



Source: Mazria Inc. Odems Dzurec, 2005 (generated from U.S. Energy Information Administration statistics)

Architecture 2030's Climate Action Plan calls for drastic reductions in the level of greenhouse gas emissions from the buildings sector, with the goal of matching 1990 emission levels in 2030, and continuing the reductions to sustainable levels of emissions by 2050, to avoid catastrophic climate change.

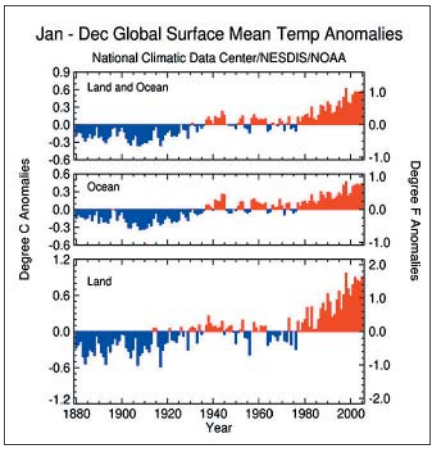
Newsbriefs

Mazria Launches Architecture 2030 to Combat Climate Change—Ed Mazria, AIA, author of *The Passive Solar Energy Book* and a leading advocate for energy efficiency in buildings, has created an organization to amplify his call to action. Architecture 2030 aims to "conduct research and provide information and innovative solutions in the fields of architecture and planning, in an effort to address global climate change," according to its website. Mazria has identified architects as potential drivers of a solution to global warming: "We control what goes into the construction of a building . . . we can change the industrial sector at the stroke of a pen," he says. Architecture 2030 was created by Mazria Inc. Odems Dzurec, an architecture and planning firm, and sponsored by the nonprofit New Energy Economy. The organization is online at www.architecture2030.org.

2005 Sets Record for Weather-Related Costs—2005 set a new record, according to estimates from the Munich Re Foundation, with more than $200 billion in economic losses due to weather-related disasters. Of that total, more than $75 billion was covered by insurance companies. Hurricane Katrina caused much of that loss, with damages estimated at $125 billion, of which about $45 billion was insured, according to the Foundation. "There is a powerful indication from these figures that we are moving from predictions of the likely impacts of climate change to proof that it is already fully underway," says the Foundation's director, Thomas Loster. "Above all, these are humanitarian tragedies that show us that, as a result of our impacts on the climate, we are making people and communities everywhere more vulnerable to weather-related natural

disaster." The previous record of $145 billion was set in 2004.

2005 Among Hottest Years on Record—2005 was among the hottest years on record, according to several organizations and government agencies. Two analysis systems used by the National Oceanic and Atmospheric Administration (NOAA) place 2005 warmest ever recorded and second only to 1998, during which a strong El Niño episode contributed to warming. The National Aeronautics and Space Administration (NASA) found 2005 to be the warmest on record. The World Meteorological Organization, whose data is not yet final, believes 2005 is likely to have been among the warmest four years on record. The year also set records in several other climate-related areas, including several related to hurricanes. "The observed rapid warming," according to NASA, "gives urgency to discussions about how to slow greenhouse gas emissions."



Source: National Oceanic and Atmospheric Administration

These graphs from the National Oceanic and Atmospheric Administration show a significant warming trend of over 1°C (1.8°F) since 1910. Also evident is the fact that land temperatures are more variable on an annual basis than ocean temperatures, due to the heat storage capacity of water.

Study Ranks U.S. 28th on Environment—A pilot study by Yale and Columbia universities ranked the U.S. 28th in environmental performance. The 2006 Environmental Performance Index ranked countries based on sixteen indicators related to environmental health, air quality, water resources, productive natural resources, biodiversity and habitat, and sustainable energy. New Zealand scored first among all countries, earning 88 out of 100 possible points. Sweden, Finland, the Czech Republic, the U.K., and Austria also scored 85 points or higher. The U.S. scored 78.5 points, coming in behind most of Western Europe, Canada, Malaysia, Japan, Costa Rica, Colombia, Australia, Taiwan, and Chile. The full report is online at www.yale.edu/epi/.

Sweden Swears Off Fossil Fuels—The Swedish government has set the aggressive goal of eliminating its dependence on fossil fuels by 2020, according to Mona Sahlin, minister for sustainable development. Sweden plans to harness tax credits, research, and large-scale investment in district heating, among other strategies, to wean the country off fossil fuels. Transportation, which currently accounts for about half of the country's fossil-fuel consumption, will likely prove the biggest hurdle. "Carbon-dioxide-neutral fuels" will be exempt from the country's carbon dioxide and energy taxes for the coming five years. Sweden is also helped in its goal by the fact that most of its electricity is generated using nuclear and hydroelectric power (45% and 35%, respectively), and 40% of its household waste is burned to generate energy. The minister's statement is at www.sweden.gov.se/sb/d/5992/a/51058.

Energy Tax Credits Take Effect—The new energy tax credits outlined in the U.S. Energy Policy Act of 2005 took effect on January 1, 2006. For more information on the provisions in the act, see *EBN* Vol. 14, No. 9.

Tighter ENERGY STAR Standards for Clothes Washers—The U.S. Department of Energy (DOE) has set tougher standards for clothes washers to qualify for the ENERGY STAR® label, beginning January 1, 2007. The new standards increase the modified energy factor (MEF), the capacity of the clothes container divided by the total energy consumption per cycle, from 1.42 to 1.72 ft^3/kWh per cycle. The new standards also introduce a water factor (WF), defined as gallons of water used per cycle divided by the cubic feet of washer capacity, and cap it at 8.0. (The current criteria for clothes washers to be listed in *GreenSpec*® are more stringent, requiring a minimum MEF of 1.8 and a maximum WF of 5.5.) More information about ENERGY STAR is online at www.energystar.gov.

New Jersey Adopts Green Cleaning Plan—Recognizing that "utilizing less hazardous cleaning products in our State facilities and workplaces, and implementing measures to reduce exposure to those products, can minimize harmful impacts to office and custodial workers as well as improve air quality and reduce water and air pollution," New Jersey Governor Richard Codey signed an executive order in January 2006 requiring State facilities to use only green cleaning products, defined as "having properties that minimize potential impacts to human health and the environment." The order is online at www.state.nj.us/infobank/circular/eoc76.htm. For information on design for cleanability, see *EBN* Vol. 14, No. 9.

SUNY Canton Offers Degree in Renewable Energy—The New York State Education Department and the State University of New York (SUNY) have approved a new four-year undergraduate program in renewable and alternative energy applications, including wind, solar, geothermal,

fuel cell, biofuel, and other emerging technologies. SUNY Canton will offer the program beginning with the fall 2006 semester. The New York State Department of Labor anticipates 750 new job openings in this field by 2010. SUNY Canton is online at www.canton.edu.

Yestermorrow Offers Free Deconstruction Workshops—Yestermorrow Design/Build School in Warren, Vermont, together with ReCycle North of Burlington, Vermont, and Habitat for Humanity, will offer two five-day training courses in April 2006 on building deconstruction and the use of reclaimed building materials in new residential construction. The courses are intended for nonprofit organizations interested in starting building deconstruction programs or reused materials programs, or for existing programs seeking to increase their skills and effectiveness. A grant from the U.S. Environmental Protection Agency will cover all tuition costs and provide travel stipends for participants. For more information, contact Kate Stephenson at 802-496-5545 or kate@yestermorrow.org.

Music Wood Initiative Pushes for FSC—Greenpeace International unveiled the Music Wood Initiative at the January 2006 trade show of NAMM, the International Music Products Association. The Music Wood Initiative was created to limit the environmental and social degradation caused in the making of musical instruments. "If you walk through a music store, the instruments are comprised of a virtual who's who of often exotic species from the four corners of the globe," according to the program's website. The Music Wood Initiative encourages instrument manufacturers to use wood certified according to Forest Stewardship Council (FSC) standards and encourages musicians to request these products. The campaign is focused on Sitka spruce, which grows only in the North American coastal temperate rainforest and is commonly used to make soundboards for guitars and pianos. Gibson, C. F. Martin & Company, Dave Maize Acoustic Guitars, and the Toyo Piano Manufacturing Company, Ltd., already offer FSC product lines. Details are online at www.musicwood.org.

Centennial College Launches Green Architectural Technology Program—Centennial College, a community college based in Toronto, Canada, has launched a full-time program in architectural technology that emphasizes green building design and construction. "The three-year program prepares students to work as technologists alongside architects, engineers, builders, contractors, and municipal building departments," according to the school. "Using state-of-the-art computer technology, students will learn to create designs, construction drawings, and specifications for residential, commercial, and institutional buildings." For more information, visit www.centennialcollege.ca/setas/.

Hawaii Gateway Energy Center Achieves LEED Platinum—The 3,600 ft² (334 m²) Hawaii Gateway Energy Center, located at the entrance to the Natural Energy Laboratory of Hawaii Authority in Kailua-Kona, has achieved a LEED® Platinum rating. The building features a 25-kW photovoltaic array designed to produce more energy than the building consumes, and uses a deep-seawater system for passive space cooling, shallow-root condensation irrigation, and condensation collection of nonpotable freshwater for deep-rooted plant irrigation and toilet flushing. The building was designed by Ferraro Choi and Associates, Ltd., with the Rocky Mountain Institute/ENSAR Built Environment Team serving as LEED consultant.

AIA Announces Sustainability Conference and Competition—The American Institute of Architects Committees on Design and the Environment (COD and COTE) are cosponsoring a conference called "The Architecture of Sustainability" and a design competition called "A House for an Ecologist" (formerly known as eco:dwell) to explore sustainability as an architectural agenda. Judges for the competition are Peter Bohlin, FAIA, of Bohlin Cywinski Jackson in Wilkes-Barre, Pennsylvania; Allison Ewing, AIA, of Hays + Ewing Design Studio in Charlottesville, Virginia; and James Timberlake, FAIA, of Kieran Timberlake Associates, LLP, in Philadelphia. More information about the conference, to take place May 4-7, 2006, is online at www.aia.org/ev_cod_may06. More information about the competition is at www.aia.org/br_cfe_cod_ecodwell06.

Photo: Natural Energy Laboratory of Hawaii Authority

The Hawaii Gateway Energy Center in Kailua-Kona, Hawaii, completed in January 2005, earned a Platinum rating from the U.S. Green Building Council.

Awards & Competitions

Award Briefs

DOE Announces 2006 EnergyValue Housing Award Winners—The U.S. Department of Energy (DOE) has announced the winners of its annual EnergyValue Housing Awards, designed to promote and improve the energy efficiency of new homes in the U.S. The program is funded by DOE's Building America Program and the National Renewable Energy Laboratory with support from several private sponsors, including BuildingGreen. Anderson-Sargent Custom Builder, LP, based in Waxahachie, Texas, was named Builder of the Year. Other winners were awarded in five categories (affordable, custom, factory-built, multifamily, and production) and three climate regions (cold, moderate, and hot). The winners are profiled at www.nahbrc.org/evha/.

Zody Wins Good Design Award—The Zody™ chair from Haworth, Inc., was granted a 2005 Good Design™ Award from the Chicago Athenaeum Museum of Architecture and Design. The international program recognizes "designers and manufacturers for advancing new and innovative product concepts and originality and for stretching the envelope beyond what is considered standard product and consumer design." The Zody, which contains up to 51% recycled content and is up to 98% recyclable, has earned Gold certification through MBDC's Cradle to Cradle™ rating system. For more on the Zody or MBDC's rating system, see *EBN* Vol. 14, No. 7. Haworth is online at www.haworth.com.

EPA Calls for P3 Award Entries—The U.S. Environmental Protection Agency (EPA), along with dozens of government, industry, and nonprofit partners, is accepting applications for the 2006 P3 Award, a design competition for scientific and technical solutions to environmental challenges. "P3 highlights people, prosperity, and the planet—the three pillars of sustainability," according to the program website. The contest is limited to undergraduate or graduate institutions of higher education located in the U.S., but EPA encourages collaboration with industry, nonprofit organizations, government, and the scientific community, as well as with schools outside the U.S. Winning teams will receive up to $10,000 each to research and develop their projects as well as the chance to compete for up to $75,000 to further develop their designs, implement their projects in the field, and bring them to the marketplace. Submissions are due February 20, 2006. Details are online at http://es.epa.gov/ncer/p3/.

Then & Now: 1996-2006

Ten Years Later: Strawbale in the Building Codes

Ten years ago, *Environmental Building News* (*EBN*) reported on the first building codes for strawbale construction (see *EBN* Vol. 5, No. 1). The State of Nevada had recently passed a mandate requiring local jurisdictions to permit strawbale buildings, and California had approved voluntary guidelines that could be adopted at the local level. On January 1, 1996, the County of Napa, California, adopted that state's strawbale building guidelines, becoming the first government body to officially adopt a strawbale building code. The next day, the City of Tucson and County of Pima, Arizona, adopted one that had been in development there for more than two years (and upon which the California guidelines, along with most subsequent strawbale codes, were based). Later that month the State of New Mexico approved a draft of Standards for Non-Loadbearing Baled Straw Construction, which was adopted into its state building code in 1997. Over the next half-dozen years, strawbale codes were adopted in many California jurisdictions, as well as in parts of Texas, Colorado, Arizona, and Nebraska, and the entire state of Oregon.

The alternative materials and methods clause in the model codes, and now in the International Code Council's International Building Code® (IBC), has always been an open door to strawbale, but "having it specifically included in the codes gives it much more credibility in many people's eyes—including building officials, lenders, and the insurance industry," Martin Hammer, a Berkeley, California, architect who has been working with strawbale codes since 2001, told *EBN*. The move toward codification does seem to have improved the perceived legitimacy of strawbale. Getting permitted is much less difficult than it once was, even for the significant percentage of permitted strawbale structures built in code-enforced areas that have no specific codes for strawbale in place.

Chris Magwood, who leads the Sustainable Design and Construction course at Fleming College in Haliburton, Ontario, and has authored two books about strawbale building, told *EBN* that "code activity in the U.S. has made it much easier to get approvals here in Canada," where no

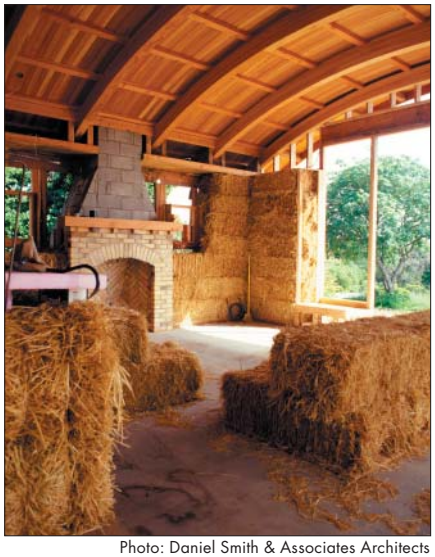


Photo: Daniel Smith & Associates Architects

This 3,500 ft² (325 m²) strawbale residence in the Santa Cruz Mountains includes a two-story entrance hall, an art gallery, and a central courtyard overlooking the Pacific Ocean. Domestic hot water and auxiliary space heating are provided by a combined solar thermal system; a photovoltaic system supplies electricity.

strawbale codes exist. At one point, according to Magwood, the Ontario Straw Bale Building Coalition considered creating a strawbale code for its area but decided that the cost and the effort weren't justified. Over one hundred strawbale structures, including urban projects, have been built in the Ontario area in recent years without significant permitting difficulties.

Strawbale buildings are also going up in areas of the U.S. without enforced building codes (and certainly some small number are sneaked in under the radar of local officials). Most are probably examples of reasonably good craftsmanship, and a few may represent the very best strawbale has to offer, but the overall performance and serviceable lifespan of some of them is anybody's guess. "I think codes serve a purpose—maybe simply to help monitor good construction versus bad construction," says Joyce Coppinger, director of the Green Prairie Foundation for Sustainability in Lincoln, Nebraska, publisher of *The Last Straw*.

Hammer concurs. "The worst that happens with no code is that failures get built," he says, stating that the benefits of a well-written code outweigh the freedoms of building in a vacuum. Since failures often get more attention than successes, he senses the danger of a skewed perception. "When there's no code or guidelines, people invent things—not always very well. However, innovation has always been one of the strengths of strawbale building, so we need a code that still allows that while addressing preventable disasters."

Some have argued that codification is a double-edged sword, particularly when the regulated item is neither proprietary nor sponsored by any industry; a prescriptive code can ultimately mandate less-than-best practices for decades despite initial good intentions. The issue of climate-applicability is also a concern—as Coppinger notes, "California's code is good . . . but is it appropriate for Massachusetts?"

Hammer thinks both issues can be handled appropriately in a single, universal document but concedes, "Even with a very clear and explicit provision that other techniques or methods can be permitted to satisfy the intent, if something's in black and white, it creates inertia." The next step, he believes, is to incorporate a carefully crafted set of performance and prescriptive minimum standards for strawbale construction into the IBC as an appendix. An appendix, rather than an amendment of the code itself, would fall somewhere between nothing and a mandatory provision—a common groundwork that could be more readily adapted by local jurisdictions throughout the country to their unique conditions. In the meantime, Hammer is working on a strawbale building code requested by the State of California to replace its guidelines and to reflect recent testing, experience, and understanding.

The Spring 2006 issue of *The Last Straw* (No. 53) will include a thorough review of strawbale building codes, as well as an extensive report on recent strawbale testing. *– MP*

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Product News & Reviews

A Quieter XLerator

When we reviewed the XLerator® electric hand dryer four years ago (see *EBN* Vol. 11, No. 1), the only downside we found was that the noise might be a little . . . much. The sound of the Xlerator's 16,000-ft/minute (5,000-m/minute) airstream being deflected off hands can reach 90 decibels. Since that sound level can be a problem in some installations—such as quiet restaurants or thin-walled office buildings—Excel Dryer, Inc., has developed an easy, lower-noise, no-cost retrofit for customers who request it.

"What we did was design a new nozzle with a larger air outlet that reduces the air deflection noise, dropping the overall sound by 9 or 10 decibels," according to Bill Gagnon, marketing manager for Excel Dryer. The larger throat adds two to three seconds to the drying time, but the 13- to 18-second performance is still impressive compared to the 30 to 45 seconds many electric hand dryers require. The only tool required for the nozzle retrofit is a screwdriver.

The XLerator, which BuildingGreen named a Top-10 Green Building Prod-

uct for 2002 (see *EBN* Vol. 11, No. 12), is now also available through Sloan Valve Company. Encouraged by good field performance, Excel Dryer recently extended the XLerator's warranty from three years to five. – *MP*

For more information:

Excel Dryer, Inc.
East Longmeadow, Massachusetts
800-255-9235
www.exceldryer.com

Photo: Excel Dryer, Inc.

The new and improved XLerator hand dryer has a redesigned outlet to reduce the noise generated by its high-speed airflow.

U.S. Plastic Lumber Becomes Trimax Building Products

In an effort to capitalize on the brand value of one of its many acquisitions, the financially troubled U.S. Plastic Lumber (USPL) company has been renamed Trimax Building Products, Inc. The rechristening follows the purchase of the company by a private equity firm, American Pacific Financial Corp., according to a January 16, 2006, *Plastics News* article. A business unit of American Pacific was the debtor-in-possession lender of USPL through the plastic lumber company's bankruptcy (see *EBN* Vol. 13, No. 9); other debtors opposed the sale.

The new Trimax Building Products is operating as an independent company under American Pacific. Trimax currently sells products under four brands:

- Recycle Design outdoor furniture, combining recycled plastic with high-end metal components;
- DuraWood recycled-HDPE dimensional lumber;
- Trimax Decking (formerly Care-Free Xteriors) recycled-HDPE decking boards and accessories; and
- Trimax Structural Lumber, based on the original structural product from Trimax of Long Island, consisting of recycled plastic with reinforcing glass fibers constituting 30% of the product by weight.

Now that the company has divested itself of its wood-plastic composite products, it is not shy about disparaging them. Composite decking can "stain, fade, discolor, and even suffer termite damage," according to the Trimax Building Products website. – *NM*

For more information:

Trimax Building Products, Inc.
Chicago, Illinois
866-987-4629
www.trimaxbp.com

Kohler Highline 1.1-gpf Toilet

At the 2006 International Builders' Show, Kohler Company introduced a new 1.1 gallon-per-flush (4.2-lpf) toilet that fits well within the definition of a high-efficiency toilet (HET)—see page 5. The Highline™ Pressure Lite 1.1-gpf toilet is a redesign of Kohler's older Highline toilets that have been serving commercial building owners for years. The new Highline 1.1 uses the Sloan FlushMate IV flush mechanism—a system that BuildingGreen recognized as one of our 2004 Top-10 Green Building Products (see *EBN* Vol. 13, No. 12).

We were struck by the quiet operation of the display model we examined at the International Builders' Show—it seemed no noisier than a conventional gravity-flush model. (Most pressure-assist toilets make a distinctive—and startling—"whoosh" when flushed.) According to Shane Judd, product manager for toilets at Kohler, the company codeveloped the bowl with Sloan Valve Company, optimizing flush performance while reducing noise by 12 decibels.

"Sloan couldn't be more proud to have Kohler as a partner on this," says Jim Allen, manager of water conservation programs at Sloan. "They've done a great job on refining the bowl hydraulics for maximum performance and reduced noise." Kohler used advanced "noise-mapping and frequency analysis technology" to make this toilet among the quietest pressure-assist toilets on the market. (For more on pressure-assist flush technology, see *EBN* Vol. 13, No. 1).

The Kohler Highline 1.1 is available only in a Comfort Height™ configuration, which meets Americans with Disabilities Act (ADA) requirements. By using a smaller pressure vessel, Kohler was able to design a smaller, more streamlined tank than is possible with 1.6-gpf (6.0-lpf) pressure-assist toilets.

In terms of flush performance, at press time, *EBN* had not received MaP test results for this toilet;

Kohler's new Highline toilet features a super-low 1.1-gallon (4.2-l) flush, a sleek tank design, and a redesigned toilet-bowl rim that reduces flushing noise. Photo: Kohler Company

according to Judd, the MaP testing should be completed in February 2006. Meanwhile, Sloan Valve told *EBN* that its own internal tests (not considered a substitute for the third-party MaP testing) show the performance to be in excess of 800 grams. For more on the MaP test for flush performance, see *EBN* Vol. 13, No. 1, and this issue, page 4.

The Kohler Highline 1.1 carries a list price of $508, according to Judd. "Prices vary by customer and region, but, generally speaking, a contractor could expect to pay $230 to $250 for the Highline," says Judd. This is comparable to other pressure-assist and high-performance toilets. The toilet is currently available. – *AW*

For more information:

Kohler Company
Kohler, Wisconsin
800-456-4537, 920-457-4441
www.kohler.com

Sloan Valve Company
Franklin Park, Illinois
800-982-5839, 847-671-4300
www.sloanvalve.com

Tarkett Acquires Johnsonite

Tarkett AG, the world's largest manufacturer of resilient flooring, has acquired Johnsonite, a producer of specialty flooring and flooring accessories. Johnsonite, based in Chagrin Falls, Ohio, makes flooring adhesives with low emissions of volatile organic compounds (VOCs), entryway track-off systems, and flooring produced from recycled tires, among other products. Johnsonite will retain its brand identity and management team, according to Tarkett. "Johnsonite is one of the most respected companies in the flooring industry in America," says Marc Assa, CEO of Tarkett AG. "We expect to build on this brand strength by marketing suitable Tarkett high-performance commercial solutions under the Johnsonite name." Tarkett is online at www.tarkett.com. Johnsonite is at www.johnsonite.com. – *JB*

Polished Concrete *(from page 1)*

ades. These are relatively inexpensive—typically $0.75 to $2/ft^2 ($8 to $22/m^2). They achieve a hard, shiny epoxy or polyurethane surface that is resistant to most chemical attacks and stains, and effectively prevents dusting of the concrete surface. However, these coatings are just that—coatings. They deteriorate with wear and have to be reapplied periodically—as often as every five years.

Floor wax on concrete is even less expensive to apply and it also creates a smooth, shiny surface. But the wax wears through quickly and has to be reapplied. Worse, the old wax layers periodically have to be chemically stripped prior to the application of a new layer. Both the stripping and the waxing generate significant volatile organic compound (VOC) emissions.

How Concrete Polishing and Densification Works

In discussions here, we focus primarily on the RetroPlate system; procedures are somewhat different for competing systems, though all are applied by trained professionals using sophisticated equipment. Here's how the process works. Large, walk-behind machines with rotating diamond-abrasive heads remove the surface layer of the concrete and achieve a fine polish. Progressively finer diamond-abrasive wheels are used, starting with 30- or 40-grit, a very coarse grinding abrasive that removes thickness quickly, and moving to 150- and then 300-grit grinding using metal-bonded diamond heads. From there, *resin-bonded* diamond heads achieve various degrees of polishing—for example 800-, 1,000-, 1,500-, and 3,000-grit. The final 3,000-grit polish creates a highly reflective sheen.

The better grinding and polishing machines have one large drive with a 19"- to 32"-diameter (50–80 cm) disk that rotates in one direction, with several smaller heads mounted on it that rotate in the opposite direction. The result is that the diamond abrasives travel randomly over a large diameter, producing a flatter grind.

The grinding and polishing machines can operate either wet or dry. Dry grinding shortens the life of some grinding heads, due to heat build-up; integral high-efficiency vacuum systems capture nearly all of the dust generated. Wet grinding and polishing does not generate dust, but it does produce a slurry that has to be disposed of. Some processes start with dry grinding, then switch to a wet process when the densifying chemicals are applied (see below).

The grinding and polishing machines are heavy and expensive, and they use a lot of power. Often, they operate at 220 or 460 volts using three-phase power at up to 30 amps; some require transformers to step the voltage up or down. Floor grinders and polishers weigh from 300 to 1,500 pounds (136–680 kg) and cost from $8,000 to $30,000, according to *Concrete Construction* magazine. Heavier machines are beneficial when significant thickness has to be removed.

At some point in the grinding process, sodium silicate (or a related silicate or siliconate) is applied to the floor to densify, or harden, the concrete. The solution is absorbed into the concrete matrix, filling the pores. Chemically, the silicate reacts with the calcium hydroxide in the concrete to produce calcium silicate hydrate. Sodium silicate is the most common hardener, and a proprietary formulation of it is used in the RetroPlate process. Potassium silicate, lithium silicate, and various siliconates are also used in other proprietary formulations. After the silicate infuses into the concrete, it

crystallizes in place. Then the polishing continues. This silicate-hardening process is very similar to what happens chemically with mineral silicate paints (see *EBN* Vol. 12, No. 10 and Vol. 12, No. 12).

The thickness of the concrete floor that is removed depends on the condition of the slab and the needs and preferences of the client. With older slabs, or where a terrazzo look is desired (with aggregate exposed), it may be necessary to remove as much as ¼ inch (6 mm). More commonly, a much thinner layer is removed (about 1/16 inch, 1.6 mm); this does not extend into the concrete aggregate, but only into the hardened cement fines or paste.

With new concrete, it is possible to obtain various appearances by adding colored aggregate (glass cullet, bits of metal, colored stone, etc.), by "seeding" the surface of the slab with additional aggregate before the concrete sets, and by adding integral pigments or other ingredients to the concrete. Various tips, such as using a low-slump mix (to keep aggregate near the surface) and avoiding walking through the wet concrete (which can push the aggregate down and result in noticeable pattern differences in the polished surface), will help to ensure an attractive finish. With new concrete applications, the polishing and hardening process cannot be done for at least 28 days—some suggest 45 days—to allow the concrete to set fully.

Concrete grinding and polishing relies on highly advanced machines that HTC pioneered in Europe in the early 1990s. Photo: HTC-America

Advantages of Polished, Densified Concrete Floors

Silicate-densified, polished concrete floors have a number of significant environmental, health, and economic benefits.

Durability

The polishing and densifying process creates a very hard, durable surface. The RetroPlate system increases the abrasion resistance of the concrete surface by up to 400% and the impact strength by up to 21% (based on ASTM C805 tests), according to the company. The surface is not affected by ultraviolet (UV) light, and it resists liquid penetration. RetroPlate carries a ten-year warranty, though significantly longer life is expected.

Low maintenance

From an economic perspective, the biggest selling point of polished, hardened concrete is its very low maintenance requirements. (See table for life-cycle costs on page 14.) Keith Powell, whose company, Summit Industrial Maintenance, Inc., in Dayton, Ohio, offers a wide range of floor-finishing systems, including epoxy coatings, has seen his business increasingly shift toward concrete polishing and densification. "The case for maintenance really changes people's minds," he told *EBN*. "We don't see any reason to coat floors," he says. "There's no stripping or waxing, ever."

Repair and reuse of old slabs

RetroPlate was initially developed as a way to solve dusting and spalling problems with old warehouse floors, and it is still widely used for restoring concrete floors. Roughly half of the 700,000 ft² (65,000 m²) of floor that Summit has treated with concrete polishing and densification in the past two years have been older floor slabs. Concrete polishing and densification makes an old slab new again—actually far better than when it was new. Acid stains can be added during the process to adjust the color of older slabs.

Structure as finish

When a fairly standard concrete slab is converted into an attractive, shiny, finished floor, adding a separate finish floor is unnecessary. Conventional practice with concrete floor slabs has been to add topping slabs, glue on resilient flooring materials (VCT, sheet vinyl, rubber, etc.), provide underlayment and carpeting, or build some other type of new floor system on top of the concrete. By polishing and densifying the concrete, all these options are avoided, saving raw materials and money and reducing environmental impacts. As noted above, the appearance of polished slabs, especially new concrete, can be enhanced in various ways. For more discussion of the benefits of using structural components as finishes, see *EBN* Vol. 9, No. 3.

No chemicals or VOCs

Other than the sodium silicate—an inert compound that has been used in laundry detergents for 120 years and is considered very safe—RetroPlate's concrete polishing and densification uses no chemicals. There are no VOCs, epoxies, polyurethanes, waxes, or strippers, and no caustic

or acidic cleaning compounds are needed. Jeff Greene, of Greene & Gasaway Architects in Federal Way, Washington, has used RetroPlate on several schools, including Federal Way's Todd Beamer School, completed two years ago. "The basic driving issue has been indoor environmental quality," he told *EBN*. A number of architects and specifiers *EBN* spoke with expect to see this type of product increasingly replace VCT in hallways, cafeterias, and, to some extent, even classrooms in schools.

Protection of slabs from spills

Because densifying concrete reduces its porosity, chemical spills can much more easily be cleaned up before staining or otherwise damaging the floor. Peter Wagner, the marketing director at RetroPlate, describes a finished floor like GoreTex®—it allows moisture vapor to escape, yet causes liquid to pool so it can be cleaned up. The more highly polished the slab, the easier the cleanup of spills.

Noncombustibility

Polished, densified concrete is totally fire resistant. Unlike carpeting and many other types of flooring, no chemicals, such as brominated flame retardants, need to be added for fire resistance, and the floor surface does not contribute in any way to fire spread.

Improved reflectivity

Increasing the reflectivity of the floor surface may allow ambient lighting levels to be reduced. RetroPlate claims that finishing a slab floor with its system increases reflectivity by up to 30%. At a Volkswagen distribution warehouse in Richmond, British Columbia, the floor was so much brighter and reflective than expected after finishing the slab with RetroPlate that the company was able to turn off one-third of the lighting, saving a significant amount of energy.

Thermal mass

Because a layer with lower thermal conductivity is not added on top of the slab (as it is with resilient flooring or carpeting), the thermal mass of that slab can fully contribute to heat storage in the building. Any facility relying on passive solar heating or night-flushing for cooling can benefit from this feature.

Photo: RetroPlate

Concrete polishing, particularly when coupled with features like pigmentation, can achieve interesting design solutions.

Disadvantages of Polished, Densified Concrete Floors

Not everyone is thrilled with the results from polished concrete, for various reasons. At the recently completed Sequoyah Middle School in Federal Way, Washington, "we had a number of problems with the installer and were not happy with the polishing they did in tight corners, at threshholds, and in other difficult spots," reports Kristian Kicinski of Bassetti Archtitects in Seattle. Kicinski has also heard that staff at West Seattle High School are unhappy with their RetroPlate installation because they continue to polish and wax it as if it were VCT.

Safety

Slip resistance is a concern with many floor systems, but particularly with as hard a floor as concrete. Risk of injury is one of the biggest drawbacks to concrete. Intuitively, one might suspect that a highly polished concrete floor would become highly slippery—and thus more of a problem. It turns out that's not the case. "Even the high sheen exceeds OSHA and Americans with Disabilities Act (ADA) requirements for slip resistance, according to Powell and materials supplied by RetroPlate. "It isn't slippery," says Powell. "You have to put your feet on it to believe it."

Noise

Just as densifying concrete increases its light reflectivity, it may also slightly increase sound reflectivity. Though *EBN* has not seen data to this effect, a polished, densified concrete floor may be acoustically *brighter* than a standard concrete floor, and it would assuredly be louder than a floor covered in a softer material, such as linoleum, cork, or carpeting.

Thermal conductivity

As with ceramic tile, terrazzo, and other concrete floors, polished concrete floors are more thermally conductive than most other flooring options. If not insulated beneath, the concrete slab floor may provide a significant conductive pathway for heat loss from a building, and it will reduce the mean radiant temperature (MRT) of a space, making occupants feel colder at a given air temperature. While this can be beneficial in the cooling season or when a building is being cooled, allowing the air temperature set point to be kept slightly higher, it does the same in the heating season, which carries an energy penalty—making it necessary to keep the air temperature higher. Even if a concrete slab

Cost Per Square Foot of Floor Coverings and Finishes

Product	Installed Cost	Annual Maintenance Cost	Expected Life	Ten-Year Life-Cycle Cost
Acrylic Coating	$0.20	$0.50	6-12 mos	$5.10 (min.)
Epoxy Coating	$1.50 - $5	$1.50	1-5 yrs	$16.50 - $20
Urethane Coating	$0.75 - $2	$1.50	2-9 yrs	$15.75 - $17
Sheet Vinyl	$3 - $5	$1.50	9 yrs	$18 - $25
Vinyl Composition Tile (VCT)	$1.50 - $4	$1.50	10+ yrs	$16 - $20
Carpet	$2.50	$1.50	5-10 yrs	$17.50 - $20
Ceramic Tile	$7 - $8	$1.50	10+ yrs	$22 - $23
Cement Terrazzo	$12	$0.70	10+ yrs	$19
Epoxy Terrazzo	$13	$0.50	10+ yrs	$18
RetroPlate	$1.50 - $4	$0.25	10+ yrs	$4 - $6.50
RetroPlate with Acid Stain	$2.50 - $5	$0.25	10+ yrs	$5 - $7.50

Source: RetroPlate. Data from the National Terrazzo and Mosaic Association, *Concrete Construction* magazine, and other independent sources.

is insulated underneath (and at the same temperature as the air), it can feel cool to the touch, leading to occupant discomfort and requiring a higher thermostat set point.

Fatigue

Like other hard-surface flooring, polished concrete causes fatigue for those who have to stand on it for long periods of time. Appropriate area carpets or mats should be used to avoid these problems.

Economics of Polished, Densified Concrete

RetroPlate and other densified, polished concrete flooring systems are not the least expensive flooring options when it comes to first cost—though they are far from the most expensive. Powell told *EBN* that costs range from $2.50 to $5/ft² ($27–$54/m²), depending on the integral colorant or dyes, the difficulty of working in the space, and the size of the job. This is consistent with data provided by RetroPlate, though an article in *Concrete Construction* put the upper price range somewhat higher, at $8/ft² ($86/m²).

With most materials—but especially with flooring—total life-cycle costs are far different from installed (or first) costs. With some flooring options, the cost of maintenance can exceed the installation cost during the first year! Polished, densified concrete has very low maintenance cost, as noted above. The material's long life and low annual maintenance cost contribute to the lowest life-cycle costs of any common flooring type, according to RetroPlate. Typical installed costs, annual maintenance costs, life expectancies, and ten-year life-cycle costs for common flooring types are shown in the table above.

Final Thoughts

With such significant advantages of polished, densified concrete floors, it is quite likely that this will become the flooring option of choice for hard-surface flooring in schools, retail stores, industrial buildings, and a wide range of other commercial buildings. It is also likely that we will begin to see greater use of concrete polishing and densification for residential floors. It makes sense from a performance and maintenance standpoint, from an appearance standpoint, and from an economic standpoint.

– Alex Wilson

For more information:

RetroPlate™
Advanced Floor Products, Inc.
Provo, Utah
888-942-3144, 801-812-3420
Peter Wagner, Marketing Director
pbwagner@retroplatesystem.com
www.retroplatesystem.com

FGS® PermaShine
L&M Construction Chemicals, Inc.
Omaha, Nebraska
800-362-3331, 402-453-6600
www.lmcc.com

Certi-Shine™
Vexcon Chemicals, Inc.
Philadelphia, Pennsylvania
888-839-2661, 215-332-7709
www.vexcon.com

HTC Superfloor™
HTC-America
Knoxville, Tennessee
877-482-8700, 865-689-2311
www.htc-america.com

From the Library

National Review of Green Schools:
Costs, Benefits, and Implications for Massachusetts

A Report for the Massachusetts Technology Collaborative by Gregory Kats, Capital E.
Available free at www.cap-e.com.
December 2005, 66 pages.

Following up on their influential 2003 report "The Costs and Financial Benefits of Green Buildings" (see "Green Building Pays" in *EBN* Vol. 12, No. 11), Greg Kats and his team at Capital E have applied similar methods and reached similar conclusions regarding schools. For the Green Schools reports Kats

analyzed cost and performance data for 30 schools, of which 12 are in Massachusetts. He then applied Massachusetts-based factors for energy costs, teacher salaries, and other parameters to arrive at his conclusions.

On average, the report finds that green schools are built at a premium of 1.5% to 2.5%, or about $4/ft^2$ ($40/m^2$). For this premium, it shows a net present value benefit of $60 to $70/ft2. Only about $15 of that accrues directly to the school, however, mostly from energy and water savings, improved teacher retention, and lower healthcare costs. That $15 translates into nearly $200,000 per year of additional resources available for an average school (after any first-cost premium is paid for), according to Kats.

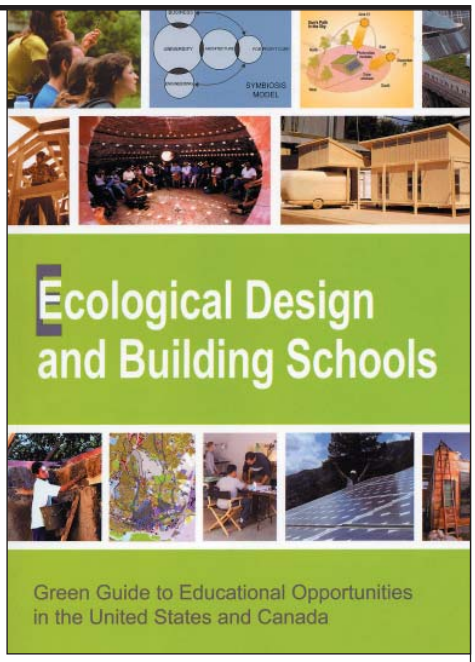
The largest benefit in Kats' analysis is based on the presumed increased earning potential for students whose achievement is improved by the high-performance schools. While the actual value is highly uncertain, Kats defends the inclusion of this number as a conservative estimate, based on the relatively strong data indicating fewer sick days and better test scores for students in green schools.

Due to limitations in the available data, the report's assumptions regarding energy savings, water savings, and other benefits are mostly from simulations and predictions rather than measured savings. Based on evidence from other sources that measured savings often fail to live up to predictions, these numbers may be somewhat optimistic. Hopefully more actual measured data will become available over time to increase confidence in the analysis. In the meanwhile, however, this report is the most comprehensive and rigorous attempt we've seen to quantify the costs and benefits.

– NM

Ecological Design and Building Schools:
Green Guide to Educational Opportunities in the United States and Canada

by Sandra Leibowitz Early. New Village Press, Oakland, California, 2005. Softcover, 178 pages, $19.95.



Searching for a master's in architecture program myself, I was delighted to hear about *Ecological Design and Building Schools*. I have been looking for a school that places ecological design at the center of its curriculum and not at the fringe; I've also been searching for reputable programs that would add practical, hands-on building experience to my design education.

One of the strengths of Earley's book is that it includes programs that meet both of these interests. It lists a total of 82 programs, in varying shades and styles of green, in three categories:

- Continuing education, nonprofessional—owner-builder schools and educational institutes offering workshops of all types and styles;
- Continuing education, professional—associations and resource centers, including the U.S. Green Building Council, that offer training programs for professionals; and
- Higher education—colleges and universities offering degree programs.

At the heart of the book, 24 pages of charts of survey results offer meaty information about what type and style of teaching is offered where; unfortunately, the results suffer from a format that renders them difficult to read, and some of the content appears to have been jumbled in the layout, with one two-page spread repeated and another omitted.

The charts and listings are supplemented by an excellent overview of the field, first with a historical perspective—beginning with the establishment of the Society of Building Science Educators in 1982—and then with an essay surveying the various types of programs available. Those involved in developing educational programs in sustainable design will also appreciate the directory of curriculum resources.

Though the book is comprehensive in its coverage, it runs into a problem of depth. Short profiles of several programs, survey results, and "lightly edited" blurbs submitted by the schools give the reader the ability to note programs of interest, but in the end the book offers more to students searching for programs with specific courses in specific geographic locations than students hoping to discern between master's-level programs to make career decisions. It does not give a sense of how various programs are regarded in the field, and it does not provide enough information for the reader to compare programs within the same category.

Nonetheless, the book's achievement—pulling this wide range of programs into one directory—should not be underestimated. This title is well on its way to becoming a much-needed clear and comprehensive description of the educational offerings available in the field of ecological design. *– RA*

Calendar

FEBRUARY

8-9 • Better Buildings by Design Conference 2006, Burlington, VT. *Organizer:* Efficiency Vermont. *Info:* 877-248-9900; www.efficiencyvermont.com.

8-9 • Green Construction 2006, San Jose, CA. *Organizer:* Construction Events. *Information:* 925-218-2225; www.greenconstruction2006.com.

9-10 • Tropical Green, Miami, FL. *Organizer*: Metropolis Magazine. *Info*: 800-715-2443; eve@metropolismag.com; www.metropolismag.com/cda/tropicalgreen.php.

26-March 1 • SPECS/2006, Lake Buena Vista, FL. *Organizer:* Chain Store Age Magazine. *Info*: 212-756-526; fbatuta@chainstoreage.com; www.specsshow.com.

MARCH

7-9 • Building Energy 2006 and Trade Show, Boston, MA. *Organizer:* Northeast Sustainable Energy Association. *Info:* 413-774-6051; buildingenergy@nesea.org; www.nesea.org.

12-14 • 2006 National Green Building Conference, Albuquerque, NM. *Organizer:* National Association of Home Builders. *Info:* 800-368-5242 x8338; registrar@nahb.com; www.nahb.org.

16 • 2006 Built Green™ Conference, Seattle, WA. *Organizer:* Parsons Public Relations. *Info:* 425-460-8238; builtgreen@mbaks.com; www.builtgreen.net.

29-30 • GLOBALCON, Energy, Power & Facility Management: Strategies & Technology, Philadelphia, PA. *Organizer:* The Association of Energy Engineers. *Info:* www.aeecenter.org/globalcon.

29-31 • GLOBE 2006, Vancouver, BC, Canada. *Organizer:* GLOBE Foundation of Canada. *Information:* info@globe2006.com; www.globe2006.com.

APRIL

19-20 • CleanMed 2006, Seattle, WA. *Organizer:* CleanMed. *Info:* 617-524-6018; www.cleanmed.org.

MAY

2-4 • Green Design Solutions, Atlanta, GA. *Organizer:* Environmental Design + Construction. *Information:* 888-530-6714; www.greendesignsolutions.com.

4-7 • The Architecture of Sustainability, Shepherdstown, WV. *Organizer:* The American Institute of Architects. *Information:* www.aia.org/ev_cod_may06.

10-12 • 4th Annual Greening Rooftops for Sustainable Communities Conference, Boston, MA. *Organizer:* Green Roofs for Healthy Cities. *Information:* 416-971-4494; www.greenroofs.net.

22-26 • 2006 ACI Home Performance Conference, Austin, TX. *Organizer:* Affordable Comfort, Inc. *Info:* 724-627-5200; lindawig@affordablecomfort.org; www.affordablecomfort.org.

JUNE

8-10 • AIA 2006 National Convention and Design Expo, Los Angeles, CA. *Organizer*: The American Institute of Architects. *Information:* www.aia.org.

4-16 • Eco-Architecture 2006: First International Conference on Harmonisation Between Architecture & Nature, The New Forest, UK. *Organizer*: Wessex Institute of Technology, UK. *Information:* www.wessex.ac.uk.

20-23 • Ecobuild America, Orlando, FL. *Organizer*: Sustainable Buildings Industry Council. *Information:* www.ecobuildamerica.com.

JULY

7-9 • Eco Show 2006 and Greenbuild Australia, Sydney, Australia. *Organizer*: WSB Media Group. *Information:* www.ecoshow.com.au.

AUGUST

13-18 • 2006 ACEEE Summer Study on Energy Efficiency in Building, Pacific Grove, CA. *Organizer*: American Council for an Energy-Efficient Economy. *Information:* www.aceee.org.

More complete information and additional listings are online at www.BuildingGreen.com.

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