Healthy Coatings for Schools: An Industry Grows Up

A green building pioneer shares lessons learned in a career that evolved with the movement.

By Robert J. Kobet, AIA, LEED Faculty, The Kobet Collaborative

In 1981, Dr. Roy E. Kerry, a member of the American Academy of Otolaryngic Allergy, approached me after a lecture I gave on energy-efficient architecture. He was interested in building an energy-efficient home for his wife, Nora Lee, who was exquisitely sensitive to a number of irritants in the built environment, some of which were debilitating for her. His concern extended to his patients with similar sensitivities, several of whom could not be treated in a conventional medical facility.

The project evolved into a combined home and oasis where Dr. Kerry could treat patients until they could be stabilized and transitioned to a more conventional medical regimen. Two years of intense research went into what was at the time an emerging interest of the architecture and design community. The result was an environmentally benign home and nurturing environment for Dr. Kerry’s family and patients.

We were inspired to know a building could be energy-efficient and nontoxic, using conventional materials and building practices, if caution was taken in applying both. Dr. Kerry’s passion for helping children, whose immune systems are not fully developed and whose reactions to poor interior air quality in schools were often caused by toxic interior finishes and cleaning products, planted the seeds for much of what I would do as a green-school consultant for the next three decades.

Thus began my professional commitment to allergy-free, nontoxic design that continues to this day.
analysis of the chemistry and environmental impact of a range of interior finishes, including architectural coatings. Learning to understand the chemistry of finishes and coatings was more challenging than learning the rules of thumb. I spent much time deciphering material safety data sheets (MSDS), now known as safety data sheets, for the products that had them; many did not.

While information on hazardous materials was available in certain industries, the modern version of the MSDS familiar to architectural specification writers was not mandated until the Occupational Safety and Health Administration issued its regulations in November 1983. That was about the time we were finishing our initial research on the Kerry house. Building-related illness was in the news and had attracted the attention of OSHA, ASHRAE and the Environmental Protection Agency, but it was more closely associated with misguided attempts to save energy by tightening buildings and reducing ventilation than with controlling sources of interior pollutants.

While teaching the course, I fielded questions from design professionals who were parents, concerned about the health and well-being of their children, including what they were exposed to in school. In the early 1990s, human ecology as a design determinant and the influence of finishes and coatings on building occupants had not made it into the study of building forensics. But it would not be long before it was front and center in the architecture and construction world, including schools.

Recognition of the Challenges Grows

For more than a decade, I was tutored by physicians who invited me to speak at conferences where often I was the only representative of the design community. Dr. Kerry and his colleagues’ coaching was comprehensive, beginning with guidelines and important cautions for creating healthy interiors. I still use their rules of thumb when considering architectural coatings (see the sidebar on page 24).

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Along the way, I applied everything I learned to green schools. Between 1981 and 1990, I co-founded the first Master of Science in Sustainable Systems program, at Slippery Rock University, Slippery Rock, Pa. My thesis was the design and construction of the Robert A. Macoskey Center for Sustainable Systems Education and Research, the nucleus of the program.

The Center incorporates nontoxic finishes and models human ecology as a design determinant. It verified a building could be energy-efficient and benign, principles that extended to site design and landscaping. Through our work at the Macoskey Center, we demonstrated that the discipline of allergy-free nontoxic design is more about common sense than building science.

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The nonprofit, LEED-certified Pittsburgh Glass Center, on which the author consulted, offers teaching, demonstrations and tours. Extensive ventilation, including recycled garage doors used as walls, along with recycled glass and exposed brick and concrete contribute to a healthy space that attracts world-renowned glass artists. Paint, in low- and no-VOC formulations, was used sparingly. Photo courtesy of Nathan J. Shaulis for Pittsburgh Glass Center.
Green Building Programs Emerge

In 1993, the U.S. Green Building Council was founded. The Collaborative for High Performance Schools (CHPS) was founded six years later. In 2000, the USGBC introduced LEED. In 2002, my commitment to human ecology as a design determinant was heightened with the publication of Cradle to Cradle: Remaking the Way We Make Things. McDonough and Braungart’s contribution to the art and science of reducing the influence of harmful chemicals in everyday products provided fresh inspiration and validation for creating nontoxic environments.

Today the USGBC and CHPS are primary drivers in market transformation to benign finishes and coatings in schools. I’ve followed the USGBC from its beginning and have been privileged to chair the LEED for Schools initiative. Along with the majority of the architecture, engineering and construction community, I have watched the original credits for Materials and Resources and Interior Environmental Quality (IEQ) evolve from basic concerns over using volatile organic compounds in the earliest versions of LEED and CHPS, to the more recent emphasis on full disclosure and transparency exhibited in LEED Version 4.

Looking back, I believe our ability to specify ecologically sound finishes and coatings with confidence results from various building ecology developments occurring during the last two decades. Some of them follow:

**Product manufacturers’ response to the demand for nontoxic finishes and coatings.** Early on, few coatings and finishes were medically benign. Today we have a wide range of choices that are cost-competitive, tested and reliable. Numerous manufacturers have issued their own green material standards and product guidelines.

**The evolution of the medical profession and its continued dedication to under**

(Below) Plumosa School of the Arts is oriented to maximize daylight and the connection to the outdoors. Ninety percent of regularly occupied spaces have exterior views.

Photo courtesy of Harvard Jolly Architecture.
standing the influence of the built environment on our general well-being. That includes patient education. It also means preventing exposure to incitants in the built environment, including finishes and coatings, rather than simply treating symptoms of building-related illnesses.

Designers of Plumosa School of the Arts K-5 building developed a detailed plan for managing indoor air quality. Low-emitting materials were specified for the project, including adhesives and sealants, paints and coatings, and floor, ceiling and wall systems. Photo courtesy of Harvard Jolly Architecture.

(Below) A speaker at Slippery Rock University’s Robert A. Macoskey Center presents on green building materials. For the author, designing the Center verified that a building could be energy-efficient and benign for occupants. Photo by Liz Glazier, SRU Communications Department.

The author consulted on the Ann Jones Gerace Center, in Pittsburgh, which combined new construction and the renovation of a century-old urban building. The result is an allergy-free, nontoxic workplace and educational center. Photo courtesy of Conservation Consultants Inc.
Unfortunately, eliminating the school nurse in many districts has set back what should be the first line of defense against sick schools.

The emergence of the integrated design process for specifying building systems, materials, and products, and practices. Through integrated design, practitioners are transitioning from single-issue design decisions to a more holistic approach to specifying finishes and coatings. A material’s ability to reflect natural light in a classroom is now evaluated along with whether it will off-gas anything toxic.

The emergence of laboratories and testing agencies dedicated to certifying finishes and coatings. Many of these are embedded in LEED and CHPS requirements and provide the default indices for acceptable building materials. OSHA, GREENGUARD and Green Seal certifications, the California’s South Coast Air Quality Management District standards and many others have contributed to built-environment awareness and product safety.

These developments have not been without controversy. The plastics and vinyl industries, among others, have challenged changes to the Materials and Resources and IEQ credits in LEED. These challenges have led to outright political opposition to LEED.

Some of the opposition is fueled by accusations that LEED has created a “red list” of materials that cannot be used in LEED projects, although that would be more in keeping with the criteria of the Living Building Challenge than LEED or CHPS. The USGBC has stated that it views the Materials and Resources and IEQ requirements as a mechanism for showing users how to obtain information about products, and for showing manufacturers how to compile it.

The Evolution Continues

LEED and CHPS no doubt will continue to influence how we specify finishes and coatings in green schools. But in setting priorities, designers and contractors will continue to balance various factors. My colleague Mark Sechrist, an expert in designing high-performance green schools, discussed some of these factors with me, and shared some guidance. See the sidebar on page 26.

Like many aspects of design and construction, issues involving architectural coatings have evolved continuously since I began practicing 35 years ago. Many factors have influenced this evolution, from the energy crisis of the 1970s and growing awareness of human ecology as a design determinant, to the campaign for environmental stewardship spurred on by the various green building rating systems.

Specifying Architectural Coatings: Some Rules of Thumb

- If you can eliminate a toxic coating, eliminate it.
- If it cannot be eliminated, minimize it.
- If it is still problematic, encapsulate it.
- Once you have done everything to eliminate or minimize the irritant, provide effective ventilation.
- If a product is dense, homogeneous and minimally processed (stone, tile, masonry), then it is generally benign, especially if it has been manufactured using high temperatures.
- If a product is flexible, pliable and/or comprised of multiple layers (carpet, wall coverings, stair treads), then it is suspect.
- If a product is liquid or applied as an aerosol (paints, coatings, adhesives), then use extreme caution.
- Products used in combination can create chemical cocktails not registered individually on an MSDS disclosure form when they off-gas.
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Specifying Green Coatings: Balancing Durability, Climate and Cost

For insight into how a green architect balances the many competing considerations of high-performance design, author Robert Kobet interviewed his colleague Mark Sechrist, LEED AP. Sechrist and his associates at Harvard Jolly, the architecture firm headquartered in St. Petersburg, Fla., are experts in high-performance, LEED-certified schools in the demanding South-Florida microclimate.

KOBET: When specifying architectural coatings, how do you prioritize your decisions?

SECHRIST: The climate in which an architectural coating is used is a major factor in its selection for a project. We work with a lot of clients in Florida. Sun, rain, salt air, wind and extreme temperatures are all part of this climate, and we expect a coating to respond well to these conditions.

Durability and maintenance become equally important items to clients. They represent an expense that impacts maintenance and replacement schedules over the lives of buildings. If a coating has the climate qualities required, and acceptable durability and maintenance characteristics, we review the green features. If the coating’s green features are acceptable, they’ll have a heavier impact on the selection process than a coating with fewer green features.

KOBET: How have LEED, Green Globes and/or CHPS influenced your architectural coating choices?

SECHRIST: As their influence grows, we are faced with clients asking, “What are the LEED, Green Globe or CHPS qualifications of the architectural coatings being used on the project?” This push has led us to write project specifications that include a section on what green information is required about each coating during the shop-drawing submission. The project specifications have been updated to include information related to the green qualities of a coating, whether or not the project is going after certification.

KOBET: What advice can you share regarding architectural coatings?

SECHRIST: As architectural coatings such as paint and roof systems evolve, it becomes extremely important to keep informed about how surfaces must be prepared and the coatings installed according to manufacturer’s recommendations. Buildings have failed because recommended procedures weren’t followed. Fixes can be difficult and expensive if done after the fact.

Another important consideration in our Florida projects is using prefinished items from the manufacturer as opposed to field-applied. Powder coating and other prefinished exterior metal coatings provide a better, more reliable and durable outcome. Factory-applied coatings appear to last longer in Florida’s hot, salt-air climate.

KOBET: What are the most important attributes of architectural coatings?

SECHRIST: Durability, aesthetics and how green the product is play major parts in product selection. A lot of clients want to know how much architectural coatings cost. The cost usually depends on the durability/warranty from the supplier.

Coatings on buildings are generally the first items people see and experience. Coatings protect building components from the elements. The first impression of the building will have a lasting impact directly or indirectly with the public and the architectural profession. The architect has to weave aesthetics and durability together, so that the first impression of the coating lasts, at a cost the client will approve.

About the Author

Robert J. Kobet, AIA, LEED Faculty, has worked with clients on five continents for more than 35 years to create innovative places to live, work and learn. He is an educator, speaker, former chair of LEED for Schools, primary author of LEED for General Contractors and Construction Managers, and president and CEO of The Kobet Collaborative. In his blog, “Leaning Green,” at durabilityyanddesign.com, Kobet shares his vision for making green building a reality.
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