

# Breathing Easy: Indoor Air Cleaning

Though a building might meet all code requirements, it still may not be free of contaminants, according to officials from Trane, a division of Ingersoll Rand offering HVAC and building services.

Contaminants are typically brought inside in the form of germs attaching themselves to people or new furnishings that often introduce odor and volatile organic compounds. Though HVAC systems have filters, they may still be circulating germs, viruses, volatile organic compounds and other gases too small to be captured.

Trane's Catalytic Air Cleaning System is a part of the company's mission over the past few decades to promote good filtration design to keep buildings cleaner and protect the condition of HVAC equipment.

Tim Sisson, the education vertical market leader at Trane, said that over time HVAC systems have played a more prominent role in air cleaning due in part to public awareness.

In addition, ASHRAE published a position paper in June 2009 that showed a large portion of infectious droplets like H1N1 are much smaller than previously thought and can be suspended in the room air, enabling them to be transported through the HVAC system, he said.

"Traditionally people thought that infections were spread through contact only," Sisson said. "Their primary focus was only on hand washing and surface cleaning."

Officials from the company emphasized that while this is not a medical

device, the HVAC industry-developed product has been tested for results in a lab situation. The company is currently in the process of doing field testing.

"I have this conversation weekly with school administration folks — we're really trying to help with average daily attendance, that's the primary source of funding for kindergarten through twelfth grade," he said.

## Academic Performance

Because their bodies are still developing, children are more vulnerable to environmental hazards, according to the Environmental Protection Agency.

"Substandard environmental conditions in schools, such as insufficient cleaning or inadequate ventilation, can cause serious health problems for children," an agency brochure on indoor air quality for schools states. "Evidence continues to mount demonstrating that indoor air quality directly impacts student academic performance and health."

The agency defines indoor air quality as those characteristics of the air in indoor environments that impact the occupants' health, comfort and ability to perform and says scientific evidence has long demonstrated an association between poor air quality and respiratory health effects, including asthma.

Maintenance issues in schools, such as insufficient cleaning or excessive use of cleaning chemicals, have been shown to trigger allergies and asthma, which, according to the Centers for Disease

Control and Prevention, is one of the leading causes of school absenteeism.

Multiple studies have found that children's overall performance decreases with illnesses or absences from school, the agency said.

Schools with better physical conditions showed improved academic performance while schools with fewer janitorial staff personnel and higher maintenance backlogs showed poorer academic performance, the agency reports.

"Studies demonstrate that improved indoor air quality increases productivity and improves the performance of mental tasks, such as improved concentration and recall in both adults and children," officials said.

A survey done by the agency determined that ventilation rates at most schools are below recommended levels, though growing evidence suggests that improving outdoor air ventilation rates can improve student and teacher performance, increase test scores, and reduce airborne transmission of infection.

"In one study, students in classrooms with higher outdoor air ventilation rates scored 14 to 15 percent higher on standardized test scores than children in classrooms with lower outdoor air ventilation rates," the agency stated.

A brochure from the agency about the indoor air quality tools for schools, designed to help schools prevent, identify, and resolve indoor air quality problems, says in addition to reducing health risks and triggers for asthma, air quality

improvement measures can help identify mold sources, improve comfort and performance level and avoid costly repairs, as well as prevent liability problems.

The economic data the agency presents is that in a demonstration project in the District of Columbia, an analysis showed that if an elementary school had spent \$364 per year on preventive maintenance, \$1.6 million in repairs could have been avoided.

The agency reports that respiratory effects have been associated with chemical pollutants that can be found in schools, like formaldehyde and chemicals in cleaning compounds.

For students, lower concentrations of carbon dioxide were associated with higher scores on computerized tests for reaction time.

Studies show fluctuations in temperature and humidity can have an impact on comfort and concentration levels of students and staff, the brochure stated.

A statistically significant reduction in perceived mental performance among students was associated with increased indoor pollutant concentrations and lower ventilation rates to suggest an association between improved performance and lower temperatures within the comfort zone.

## Three Steps to Clean Air

The Catalytic Air Cleaning System from Trane is engineered to neutralize and reduce those organic contaminants in the air to help reduce biological organisms like spores, bacteria, and even the tiniest viruses within a building.

The system can also reduce irritating odors from organic compounds such as fumes from paint, glue and cleaning chemicals, and capture airborne particulates like dust and mold.

The system blends three technologies to capture, sterilize and vaporizes airborne contaminants — filtration, germ killing ultraviolet light and photocatalytic oxidation, all technologies that have been used in the industry for about a decade, said Arti Lyde, product manager at Trane.

Air entering the system passes through a MERV 13 high efficiency particulate filter, which captures many of the larger biological contaminants and small airborne particles like mold spores and pollen.

A MERV 13 was selected due to the amount of air pressure and energy required to push through a tightly knit filter, and captures about 50 percent of influenza A particles in the air, Lyde said.

Though HEPA filters, which are common in hospitals, can capture almost 99 percent of contaminants, they are less feasible due to equipment design, maintenance and costs.

Viruses, odors, volatile organic compounds and microorganisms then pass through the filter and into the system's ultraviolet germicidal irradiation area, where they are exposed to a high-intensity ultraviolet light. The radiation penetrates

**Royce Rolls Company**

**85 YEARS OF SERVICE**

- Durable, Stainless Steel Carts & Fixtures
- Factory Direct Prices
- 10 Year Guarantee Against Breakage
- All Carts are Shipped Assembled

Request your free catalog today!

www.RoyceRolls.net toll free 800-253-9638 fax 616-361-5976

Circle #111 on reader service card.

**LOCKERS**

- Single Tier Standard
- Double Tier Standard
- Triple Tier Standard
- Box Style Standard
- Extra Wide Standard
- Vented
- Extra Wide Vented
- Open Access
- Modular
- Designer
- Extra Wide Designer
- Open Access Designer
- Solid Oak Executive
- Plastic
- Storage
- Benches

lockers.com  
1-800-LOCKERS

Contact us for a FREE quote or catalog!

1010 East 62nd Street, Los Angeles, CA 90001-1598  
Phone: 1-800-562-5377 • Fax: 1-800-562-5399

Circle #112 on reader service card.

See M/O, page 23

# HOT PRODUCTS

## Decorative Sheet Material

InPro's Expressions line allows schools and colleges to brighten interiors with colorful images like school mascots, animals, flowers, geometric patterns – or anything a designer's imagination can conjure up. Made from InPro's rigid sheet material, the image arrives ready-to-mount with an installation template provided to guide installers. It uses standard adhesive. The line's G2 Blend is made from BioPolyPETG+ material containing PETG, biopolymer and recycled content. At the Goddard School in Highlands Ranch, Colo., corridor interiors are themed with baby animal murals made from InPro's rigid sheet material provide bright colors, easy cleanups, durability and protection, according to the company.



**InPro Corp.**  
[www.inprocorp.com](http://www.inprocorp.com)  
 Reader Service # 206

## Wood Building Resource

Woodworks delivers various types of designs for non-residential construction projects. It includes designing for earthquakes, fire protection, structural properties and performance, wind resistance, durability and service life, wood schools, wood and building codes, and green buildings. Woodworks offers resistance to lateral forces and moisture control, preventing termites and ensuring quality control. Among other things, the organization provides free education and training in areas such as wood-related code issues, seismic and wind design, and a one-stop access to resources by wood associations.



PHOTO CREDIT: APA

**Woodworks**  
[www.woodworks.org](http://www.woodworks.org)  
 Reader Service # 207

## M/O, from page 10

microorganisms such as fungi, bacteria and viruses and damages their DNA bonds to sterilize them.

As air is exposed to the irradiation light, it also passes through a mesh panel coated with titanium dioxide. When subjected to the UV protons (titanium oxide) creates hydroxyl radicals, one of the most powerful oxidizing agents in nature, according to company officials.

The UV lights recapture contaminants in the third stage, with photovoltaic oxidation panels.

Lyde said some organisms are more susceptible than others to UV light, such as viruses.

"The way that UV light works, the amount of time that a particle spends going across the light surface, the larger the dosage and the more impactful it is," Lyde said. "If you think about in a typical HVAC system, particles are moving across the light at 500 feet per minute which requires high intensity light."

Because air is able to spend extra time going across the UV light, it becomes more effective than being exposed to the light just once, she said.

The radicals and UV light work together to inactivate and decompose organic contaminants. As air passes through the UV powered catalyst, the radicals

oxidize gaseous organic compounds, reducing them to minute amounts of harmless carbon dioxide and water.

"One of the key aspects of that conversion is that the filter per say doesn't have a loading effect, and that's been one of the drawbacks, particularly when you get into odor removal applications we use this for," she said. "Traditionally that's been done with carbon filters, but ultimately carbon gets saturated and has to be replaced."

Carbon absorption technology removes contaminants from the air, but as the amount it sucks up increases, it becomes less effective, she said.

"Also, as you go into areas where you have higher humidity, like along the coasts, it's less effective," Sisson said. "One of the drawbacks with carbon absorption is it also has a high affinity for water, in other words, as humidity increases, effectiveness of this capture technology decreases and can displace the captured gasses releasing them back into the air stream."

The system is designed for low maintenance — the MERV 13 filter should be changed as is done with any conventional particle filter and air handler, and the rest of the system requires low maintenance since the UVGI and PCO evaporate rather than collect matter.

The UV lights can be changed about every 18

months. The system's media panel has an expected life span of 15 years under normal use.

Sisson said one of the challenges is being energy efficient, since HVACs are one of the largest consumers of energy.

"In our industry in particular there's always the overcasting shadow of energy consumption, our constant vigilance and goal is always to make solutions more energy efficient," Sisson said.

While increasing ventilation can improve air quality, if it's not at the right temperature and humidity range it leads to increased energy consumption, he said.

"There are always tradeoffs in how we're going to solve a particular problem," said Sisson. "When developing these technologies and utilizing them, because they're typically somewhere in the air stream, they require more energy to push through them, so those are some of the barriers in this whole equation of better indoor air quality."

The system has been on the market for a year, has been implemented in about a dozen schools in the country.

"Whether in schools or areas that there are large numbers of people in concentrated areas, it really helps as a broad-based passive solution that can be a good approach for a broad range of contaminants," Lyde said. ■

## AD INDEX

page #	circle #	page #	circle #
Acorn Engineering.....	5.....	103	
American Harlequin.....	13.....	115	
Ameristar Fence Products.....	5.....	104	
BRG Precision Products.....	21.....	121	
CEFPI.....	6.....	106	
ClearSpan Fabric Structures.....	8.....	108	
Elkay Manufacturing Co.....	7.....	107	
Georgia Power Company.....	2.....	100	
Major Industries.....	8.....	109	
Metallic Building Company.....	9.....	110	
Most Dependable Fountains.....	19.....	118	
New Jersey Smart Start Buildings.....	3.....	101	
PolyMax/Milamar Coatings.....	23.....	122	
Rigid Global Buildings.....	11.....	113	
Royce Rolls Ringer.....	10.....	111	
Salsbury Industries.....	10.....	112	
Sargent-Welch.....	13.....	116	
Scoop ReprintSource.....	12.....	114	
Southern Bleacher Company.....	20.....	119	
Vanir Construction Management, Inc.....	4.....	102	
Video Mount Products.....	15.....	117	
VS America.....	24.....	123	
Willoughby Industries, Inc.....	20.....	120	
Zeager Bros. Inc.....	6.....	105	

## MARKETPLACE

**PolyMax**

Tough Epoxy & Urethane Floors...  
 Exceptional Performance!

Slip and Chemical Resistant floors for Halls, Kitchens, Labs, Locker Rooms

800.459.7659 [www.PolyMax-us.com](http://www.PolyMax-us.com)

Circle #122 on reader service card.