

Indoor Air Quality Magazine

Making Cleaning Effective, Healthy, and Green

By Mike Sawchuk

William Hartman, Vice President of Gensler Architecture, based in the company's Detroit, Michigan, office, is directly involved with a new program his firm has created called "First Impressions." The goal of the program is to make the buildings they design, many of which are for federal and state governments, more inviting and approachable to staff and visitors alike.

However, no matter how a facility is designed, its appearance depends on how well it is cleaned and maintained. Indeed, several years ago visitors to Paris' Louver Museum—possibly the most famous art gallery in the world known almost as much for its architecture as for its art collection—reported that their first impressions of the facility were not its masterpieces or the splendor of the buildings but, instead, the fact that it appeared the facility was poorly cleaned and maintained.

The appearance of a facility, in both design and maintenance, is of course vital to the impression it makes on building users. And improving appearance has been the primary goal of the cleaning industry for decades.

However, the industry is now moving beyond cleaning just for appearance. Cleaning professionals are now focusing on their own health, that of building occupants using the facility, and the protection of indoor air quality (IAQ) as well as the health of the environment.

The goal now is effective cleaning, and to implement this, the industry is increasingly turning to science to develop technologies and systems that not only help measure the effectiveness of cleaning along with ways to protect IAQ but also determine which products, tools, equipment, and systems are best at performing a wide variety of cleaning tasks.

In many ways, this new direction was formalized in May 2007 when the Cleaning Industry Research Institute (CIRI) held their first industry-wide symposium in Las Vegas,

Nevada. CIRI was created to use science to raise awareness of the importance of cleaning. The goal of the organization is to use existing as well as new industry research to help improve people's understanding of the importance of effective cleaning and influence public policy.

More than 100 people attended the gathering to hear and discuss research papers presented by such notable people as:

- Michael Berry, Ph.D., author of *Protecting the Built Environment: Cleaning for Health*, formerly with the Environmental Protection Agency and a recognized expert on indoor environmental quality
- Steven Spivak, Ph.D., technical adviser and expert on cleaning textiles, carpets, and fabrics
- Marilyn Black, Ph.D., authority on indoor air quality issues
- Eugene Cole, Ph.D., professor of environmental health sciences at Brigham Young University
- Elizabeth Scott, Ph.D., microbiologist and expert on hygiene practices in homes and communities

Many observers believe that the CIRI symposium will prove to be a tipping point for the professional cleaning industry. Never before has the importance of the industry and its contribution to health and the environment been explored in such clear and commanding terms.

Terminologies

One of the first issues discussed at the symposium is the fact that there is no universally recognized definition for *cleaning*, which many observers believe has hampered the public's awareness of the importance of effective cleaning. According to Dr. Berry, historically what is and is not clean has been defined subjectively. Ten people may have ten different definitions for clean, whether they are industry professionals or members of the general public.

Because of this, Berry along with some of the other presenters at the gathering attempted to define the word *clean* as well as other terms used in the industry. Among these definitions:

- *Cleaning* is defined as the removal of visible and invisible unwanted soil through mechanical and manual processes.
- *Disinfecting* is the process of eliminating nearly all recognized pathogenic microorganisms but not necessarily all microbial forms such as bacteria spores.
- *Sanitizing*, often confused with disinfecting, is the use of effective cleaning to physically remove and destroy microbial contamination or at least reduce it to levels considered safe for public health.
- *Hygienic cleaning* is defined as the practice of removing soil and organisms from a surface as well as destroying harmful microorganisms by using proven cleaning systems, procedures, and chemicals.

The Contaminant Trail

Along with defining the key terms related to professional cleaning, some of the presenters at the symposium indicated it is crucial that the industry understand the “trail of contamination,” in other words, how germs, bacteria, or other contaminants travel from one person or surface to another.

Essentially, the trail starts when a potentially health-threatening bacteria, germ, or contaminant is present in the indoor environment and is spread through either direct or indirect contact. Direct contact refers to the transfer of microorganisms by physical contact between an infected person and a susceptible person through such means as touching, kissing, or intimate relations.

With indirect contact, a susceptible person is infected by touching such surfaces as:

- Doorknobs, door handles, handrails, or other high-touch areas
- Tables, beds, or chairs
- Restroom fixtures and/or surfaces
- Cups, dishes, cutlery, or trays
- Computer keyboards, mice, electronic devices, or telephones
- Pens, pencils, or office supplies

We now know that many potentially harmful forms of bacteria and other organisms can survive on surfaces for extended periods of time. And we also know that there is

really only one way to reduce or eliminate the transmission of microorganisms, and that is through effective cleaning and using the proper chemicals, procedures, tools, proper chemical dwell times, and equipment.

Floor Care and the Science of Effective Cleaning

One of the presenters, John Richter, technical advisor for Kaivac, Inc., manufacturers of no-touch cleaning equipment, attempted to put the science of effective cleaning into practice by examining the effectiveness of three different systems of removing soils and contaminants from floors. Most commonly, the tools used for cleaning floors are mops, buckets, and cleaning solution.

In this study, the three systems used were a conventional string mop head, a microfiber mop head, and a no-touch or spray-and-vac cleaning system. The latter is a type of cleaning machine that applies chemicals to floors and then rinses with pure water. Excess liquid is vacuumed up into the machine.

A urine-detection system, which measures creatinine, an indication of how much urine is on a surface, was used to

determine the amount of contaminants on the floor before and after cleaning. The results, according to Richter would scientifically confirm the usefulness of each system at removing unwanted soil, germs, and bacteria.

The testing procedure was as follows:

- Only cold tap water was used in all tests; no cleaning chemicals or solutions were used.
- A cotton string mop head was thoroughly wetted with water and wrung out in a mop bucket wringer, resulting in a damp mop.
- A polyester microfiber pad was thoroughly wetted with water; the pad was wrung in a wringer, resulting in a damp pad.
- Both the string mop and the flat mop were attached to their appropriate frames and handles.
- Using the string mop in the first floor area and the microfiber flat mop in the second area, a first and then

second pass in a crosswise direction were used to clean the floor.

- The no-touch machine was used to clean the third area. Using the low-pressure mode, the machine applied cold water over the floor. The water was then vacuumed up using the vac tool assembly on the machine.
- The entire cleaning process was repeated 11 times in all of the areas. Then the floors were again tested for the presence of residual urine using the urine-detection system.

Among the findings:

- With the string mop, approximately 31 mg/dL of creatinine residue was found in the grout lines of the floor, and 13 mg/dL of creatinine was left on the remaining floor surface.
- With the microfiber mop, approximately 31 mg/dL of creatinine residue was found in the grout lines of the

floor, and 14 mg/dL of creatinine was left on the remaining floor surface.

- With the no-touch system, less than 1 mg/dL of creatinine residue was found in the grout lines, and approximately 1 mg/dL of creatinine was left on the remaining floor surface.

The IAQ-Green Connection

CIRI has stated that it believes effective cleaning that eliminates harmful germs, bacteria, and microorganisms should always be the primary objective of cleaning procedures, with the use of environmentally preferable cleaning products being a secondary goal. However, the organization does recognize that Green cleaning products, especially those that have been evaluated and certified by independent, third-party organizations such as EcoLogo[®] and Green Seal, are often safer to use and can have a reduced impact on the environment, especially IAQ, when used according to manufacturers' recommendations.

For instance, Dr. Marilyn Black, one of the presenters, reported that more than 60 million Americans, approximately

one out of four, now experience respiratory problems such as asthma and allergies as a result of indoor substances, often cleaning products. She also noted that the primary pollutants that can negatively affect IAQ that are commonly found in conventional cleaners include such ingredients as:

- Hydrocarbons, glycols, and glycol ethers used in cleaning solvents
- Terpenes, found in fragrances
- Alcohols commonly found in disinfectants
- Chlorinated hydrocarbons used in spot cleaners and degreasers
- Hydrocarbon gases, which are often used as a propellant in aerosol products

Her suggestions to reduce the risks associated with some cleaning chemicals and to help protect IAQ, human health, and the environment centered on limiting exposure.

Essentially this includes using smaller and more controlled amounts of cleaning chemicals; improving ventilation during and after cleaning; rinsing surfaces liberally with water; and avoiding terpene-scented cleaners.

She also encouraged the industry to transfer to “more sustainable and less toxic [cleaning chemical] formulations.” This is where certified-Green cleaning products can play a role.

Green cleaning products tend to have significantly reduced amounts of volatile organic compounds, commonly referred to as VOCs. These are hydrocarbon compounds that exist in the air. Many times they have an odor, but sometimes they are not detectable by scent.

When found in large quantities in the indoor environment, VOCs can contribute to the formation of smog and may be toxic. Some examples include petroleum products, often used as a primary ingredient in cleaning chemicals, as well as alcohol and solvents.

Acknowledging Advances in Green Cleaning Technology

As supportive as most industry professionals have been of CIRI, the need for more effective cleaning, and the positive results of bringing science into cleaning, some observers

believe the organization has been slow to realize and acknowledge the advances that have been made in the performance of environmentally preferable cleaning products. Just a few years ago, many Green products were not as effective as conventional cleaning products. However, as a result of new technologies and research, most now perform as well as, if not better than, conventional cleaning products used for the same purpose.

For this reason, if the goal of CIRI is to protect indoor environmental health, it is clear that the use of certified-Green cleaning products will play an increasingly vital role. Fortunately, the desire for effective cleaning and the development of high-performing Green cleaning products have emerged at about the same time and will work together to protect IAQ, improve health, and elevate respect for the professional cleaning industry.

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Mike has developed and implemented various strategic programs in the professional cleaning industry throughout North America. His career has spanned various sales, marketing, and operations positions with both large and small manufacturers, as well as distributors.

A graduate of Brock University with a B.B. Administration, Mike also has an MBA from McMaster University.

As a frequent presenter at seminars and tradeshow as well as author of several articles discussing Green cleaning issues, Mike is recognized as a “hands-on” expert on Green cleaning chemicals and systems.