

A dynamic electronic air cleaner helps increase system efficiency and remove up to 97 percent of airborne particles at or above .3 microns. Since it cleans the inside air so well, it can reduce the amount of outside air required by the system.

Photo courtesy of Engineering Dynamics Group.

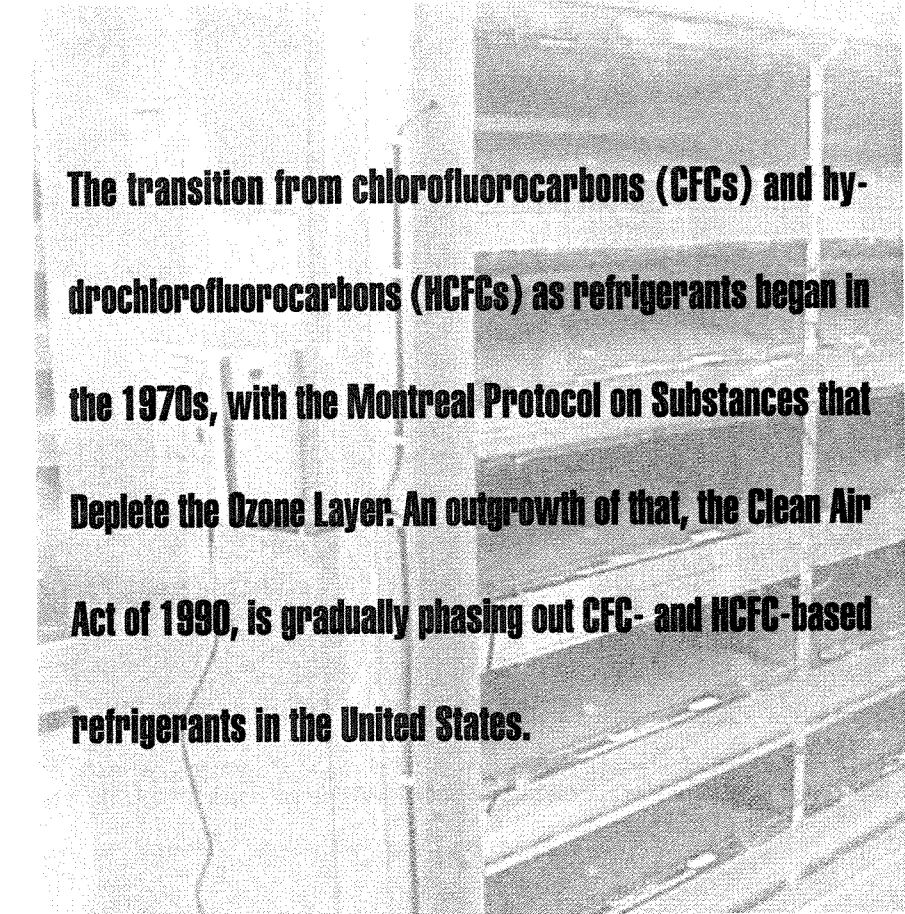
"You say you want a revolution, well you know we all want to change the world. You tell me that it's evolution..."
John Lennon and Paul McCartney didn't have the heating, ventilating and air conditioning (HVAC) industry in mind when they wrote the song, "Revolution." Still, green design, whether revolutionary or evolutionary, is changing the HVAC industry.

Industry Changes: Revolution or Evolution?

BY RUTH WOOD-STEED

The federal government has mandated some of the environmentally friendly changes that are occurring; others are industry-led. Most, if not all, changes are of an ongoing nature, some having begun nearly 30 years ago.

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The transition from chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) as refrigerants began in the 1970s, with the Montreal Protocol on Substances that Deplete the Ozone Layer. An outgrowth of that, the Clean Air Act of 1990, is gradually phasing out CFC- and HCFC-based refrigerants in the United States.

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Refrigerant Changeover Continues

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Mike O'Connell, business manager/secretary treasurer of Plumbers & Pipefitters Local 562, said: "The transition (from chlorine-based to non-chlorine-based refrigerants) applies to both commercial and residential construction. The move is toward more environmentally friendly materials, and safer methods of handling them."

Mike Jarrell, president of Charles E. Jarrell Contracting, added: "Chlorine-based equipment using R-22 (refrigerant) has to be phased out by 2010. R-22 refrigerant will no longer be made after 2020. So that's changing the design of the equipment considerably. I really don't know what the ramifications of that are yet. There will obviously be some engineering required, so I would assume it will affect cost to some degree, although I think they're (manufacturers are) trying to hold the line as much as possible."

Jarrell is designing and constructing two LEED-candidate projects now: renovation of the Security Building and the new Anheuser-Busch Engineering Technical Center. Both incorporate chilled water systems using R-134 refrigerant, a more environmentally friendly agent.

System Efficiency Improving

On January 23, 2006, a U.S. Department of Energy ruling will require new HVAC systems to be more energy-efficient. The rule, released on January 22, 2001, requires a 30-percent increase in the Seasonal Energy Efficiency Ratio (SEER). Jarrell said: "The mandate applies only up to five-ton equipment. This mostly affects the residential market. However, some light commercial, such as retail, where single-phase units are utilized, will be affected also."

Jarrell continued: "We don't know when or how much, but the efficiency will be increased all the way up in tonnage. We don't know whether this will be due to a federal mandate or just an ASHRAE recommendation, but it will occur. We've known this was coming out for some time. The manufacturers are working very hard on improving the efficiency of their equipment."



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A product fairly new to the St. Louis market, the dynamic electronic air cleaner, helps increase system efficiency. Used in place of standard air filters, dynamic electronic air cleaners employ a 24-volt transformer to create an active electrostatic field.

Carl Mitchell, Engineering Dynamics Group (EDG) national sales manager, described how EDG Dynamic Air Cleaners (DACs) work. "DACs are non-ionizing polarized-media air cleaners which cause particles in the air to become polarized, while also polarizing the media. DACs remove up to 97 percent of airborne particles at or above 0.3 microns. While this statistic is similar to currently used air filters, the DAC's electrostatic field causes smaller particles to cling to one another and to the filter, eventually becoming large enough to adhere. Thus, they provide superior indoor air quality (IAQ) to standard filters. The DACs can operate at significantly less static pressure than bag and cartridge filters, thereby reducing energy costs to run the air handlers they are installed in."

Mitchell continued: "Also, due to the way they load particles all around the surface of the media, the replacement frequency of the media can be reduced by as much as three to four times over other high-efficiency passive filters."

Trane Company Account Manager Chris Seberg added: "DACs clean both outside and return air. You can reduce the amount of ventilation air required per person if you clean the air, according to ASHRAE Standard 2-2001 acceptable IAQ guidelines.... By cleaning both outside air and return air, you lower the amount of outside air required, to as little as five cubic feet per minute per person. They can even be more efficient than HEPA (high-efficiency particulate air) filters, depending on the amount of re-circulated air."

Dave Heideman, Horner & Shifrin Inc.'s manager, mechanical engineering services, specified EDG DACs for the new Hancock Place High School in 2003. DACs also will be installed this spring in the newest phase, which is under construction. "These cleaners are so impressive that St. Louis County allowed us to cut the outdoor air by one half. We have applied to the Missouri Department of Natural Resources for a low-cost energy loan because of the savings," said Heideman.

Seberg commented: "DACs are not yet used a lot in this area, although they have been around about five or six years. They are starting to catch on more, though. Their first cost is higher than HEPA or other filters, but with

an increase in operational efficiencies and reduced replacement media cost, they pay for themselves in a fairly short time."

Controls Advancing

Other ways of improving operational efficiency also have been developing over the past few years. Jarrell said: "One thing we've been doing a lot of is direct digital control systems, a major upgrade in controls for pneumatic systems installed 10 to 15 years ago. The majority of controls we put in

today are direct digital, and have complete building management systems. They have the capability of controlling the air conditioning systems, the lights, anything electrical in the building."

Remote computer-control for HVAC systems also is advancing rapidly. O'Connell said: "A lot of the bigger firms have computers in their trucks and can troubleshoot systems from the trucks. If a building has a problem, they can call, the service guy

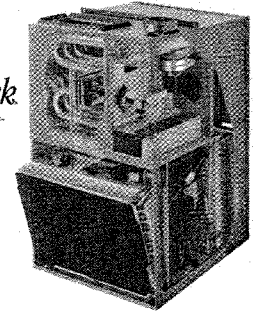
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can get in his truck right now, punch up that particular building, and start to troubleshoot it immediately."

"We currently monitor a couple hundred buildings over phone lines. This has been prevalent for a long time with large companies that have multiple facilities all over the country. That will probably eventually be over the 'Net. Web-based control is a fairly new concept within the last couple of years. We think the number of Web-based systems is going to explode," said Jarrell.

He added: "The other thing we expect to see is a lot of wireless local controls like thermostats that will give feedback to the panel in the building. Of course you will be able to access that data over the phone line or over the 'Net."

Heideman designed Web-based controls for Hermann Area District Hospital. "We expect the system to be in by April or May. The maintenance guys are really looking forward to it."

Seberg added, "When they get a call at 3:00 in the morning, they're looking forward to just going to their comput-

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er to analyze and possibly fix the problem, instead of getting dressed and driving to the hospital."

Safety and Cost — Continuing Thrusts

As with the rest of the construction industry, safety and cost remain priorities. Plumbers and Pipefitters Local 562 and the Mechanical Contractors Association (MCA) have a cooperative relationship typical in St. Louis's construction industry labor-management climate.

John Sisel, executive vice president of the Mechanical Contractors Association, described it: "There is an overriding trend. Contractors and the union talk about challenges and how to address them collectively." A joint labor-management committee meets quarterly to work for improvements. Sisel said: "We look ahead, not behind or where we are now. We have an investment in the future."

The MCA and Local 562 work closely together to achieve a safe, cost-effective construction environment. They strongly emphasize training, including safety training.

"The construction industry has been much more safety conscious over the past five to 10 years, and is continuing to be," said Jarrell.

Sisel said: "We are the only trade with a 100-percent binding, random drug testing program in the country. The program was jointly agreed to by both management and labor."

Individual contractors stress safety through project controls. "We instituted job-site hazard analysis, a daily safety meeting done by each foreman to go over the daily work tasks and the hazards and safeguards with each.... Also, our project managers do safety audits monthly on their jobs," said Jarrell.

Cost is more difficult. "We're trying to provide everything we can to our members and still keep our contractors cost-competitive," said O'Connell. But he and Jarrell agreed that health care costs have made this challenging.

"There has been a major cost increase in labor, in the 10-percent range, but it's all insurance," Jarrell said, "the men haven't gotten a nickel of it. It's because of the spiraling cost of health insurance."

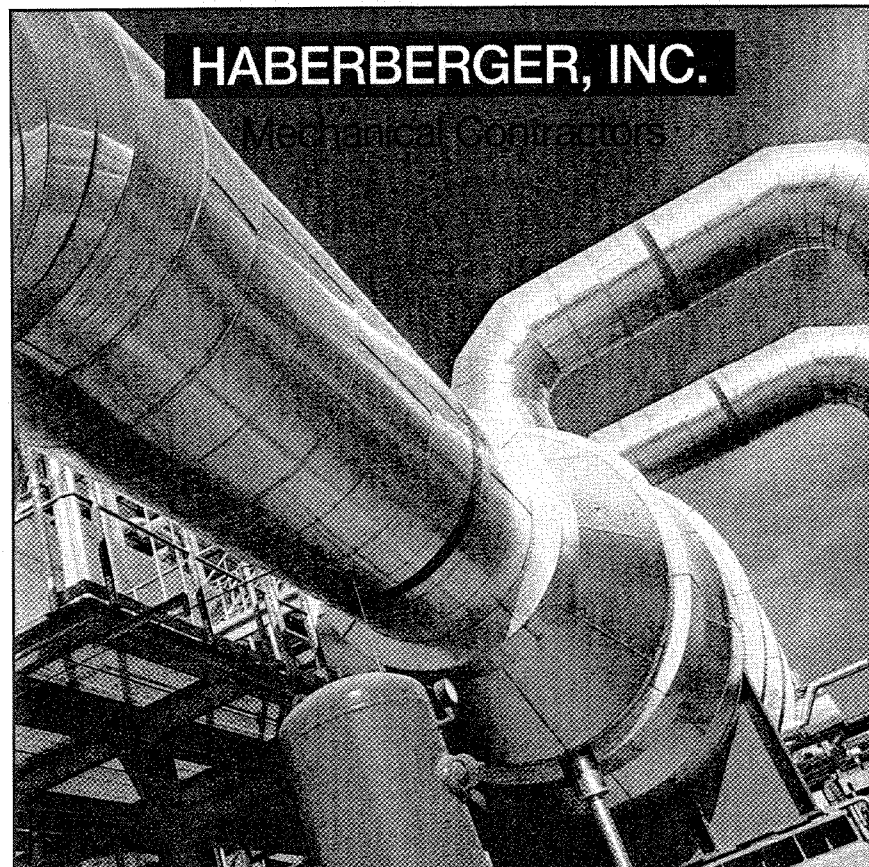
Fortunately, other than steel, material prices haven't risen significantly. "Manufacturers have pretty well held the line on prices through gaining efficiency in the manufacturing process," Jarrell said. "The last year there has been a little more inflation than normal due to the cost of steel. Last year

we saw increases (in steel prices) in the neighborhood of 70 percent. I was in Clarksville recently at the Trane plant. I think we'll see the steel problem continue through this year. It's a problem for both piping and sheet metal. Still, while it is a large portion of the work, it hasn't affected the overall job to a great extent. It has probably affected it only about 10 percent to 15 percent."

While some contractors have been slow for the past couple years, Jarrell is optimistic. "The market is very positive," he said. "HVAC work is im-

proving. The economy is improving. The state environment has been good in general. The city, though, has been very proactive. The Chase, the Coronado, Lindell Towers East and West. We have managed to grow during the last couple of years."

Whether evolution, revolution or some of each, the industry hopes Jarrell's optimism is accurate. Innovations and practices are in place to promote growth. "We're ready for anything they throw at us," said O'Connell. **CNR**



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