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Air quality specialist Rich Prill shares his tips for success in indoor air quality

Application Note

When you consider a new business opportunity, it's a smart move to talk first with a pro who knows the business inside and out.

When it comes to expanding your HVAC business to include indoor air quality (IAQ) analysis and remediation, you'll want to talk to Rich Prill. Thirty years of experience has qualified Prill as one of the nation's leading experts in indoor air quality (IAQ).

Prill serves as building science and indoor air quality specialist for the Washington State University Extension Energy Program. He spends 80 percent of his time on the road, delivering practical guidance on air quality and energy management issues to school districts, tribes, building operators and private businesses across the West.

Prill's busy schedule shows there's a continuing need for people who know how to create real-world solutions to indoor air quality problems.

If you like straight talk and getting down to business, you'd like Rich. He emphasizes the need to keep solutions simple and work hard on communication, so building managers and occupants can become part of the solution.

To start, understand how buildings work

Prill started out as a high school building technologies instructor in the mid-seventies, then as technical project manager and lead instructor at the Midland Energy Institute. He worked as a solar water heating contractor in 1982, then became principal research associate at Lawrence Berkeley National Laboratory in California, the nation's leading organization for IAQ research.

Prill's early days got him involved in retrofitting and tightening up buildings in response to the oil embargo and energy crisis of the 1970s: caulking, weather stripping, insulation and storm windows were big news then.

To gauge how airtight homes were, he began using the first "blower door," a fan fitted into an exterior doorway to depressurize the building. By measuring the pressure and flow rate through the fan, Prill could calculate the amount of leakage into the building and determine what all the home's cracks and gaps added up to in energy-wasting uncontrolled airflow.

"We got concerned over some of the dynamics associated with tight buildings," Prill says. "For instance, if you run your clothes dryer and your range hood and your bathroom fan, you might back-draft your water heater. So we started doing some research."

That early work led to his role at Lawrence Berkeley.

From Berkeley, Prill moved north to Washington in 1988, where he served as energy specialist with the Washington State Energy Office. In 1996 he took his current job with the WSU Extension Energy Program. Today his work is devoted to IAQ education for both public and private organizations, and funded through project grants. "When the grant is over, we're out of a job," he laughs. "We need to be competitive."

Yet he specifically avoids competing with consultants and others in the private sector, and keeps his focus on training. "I consider myself an educator," he says. "We'd rather teach people to fish, than give them a salmon," he says.

Building a career

Few air quality specialists fund their work as Prill does. Yet Prill's experience shows that facilities need lots of help with indoor air quality issues. HVAC contractors, with their intimate knowledge of building mechanical systems, are well positioned to add IAQ diagnostics and remediation to their portfolio of services.

When Prill started his career there were few opportunities for formal training in indoor air quality. Today that's changed, and training and certification programs are available in radon, mold remediation and many other disciplines related to IAQ.

What skills must the successful IAQ specialist master?

"You need to know how buildings work, beyond just charging up a refrigeration system or knowing how a furnace or chiller works," Prill says. "You need to understand moisture dynamics and airflow. I think I'd start by understanding pressures and flows in buildings. That's really important, because you want air to go from clean to dirty."

Though early efforts to 'tighten up' buildings sometimes damaged indoor air quality, Prill believes energy efficiency and indoor air quality go hand-in-hand.

"You can't get an energy-efficient building without paying attention," he says, "and if you're paying attention to energy, you're probably paying attention to other things, like air quality." The solution is to construct the tightest possible building envelope, then add "high-tech holes": a heating, cooling, filtration and ventilation system designed for comfort and efficiency. Finally, maintain and operate that system correctly.

It's not a simple issue, Prill points out. Buildings, their uses and their occupants change. HVAC systems may be operating as designed, yet fail to deliver the air quality expected. People sometimes alter buildings without adjusting ventilation. And when people have a comfort issue, they will close or open a duct, window or door.

To tool up for the job, Prill recommends starting with an air pressure gauge and smoke tube to help identify duct leaks and pressure differentials between spaces.

"Getting a handle on the ducts and the building and crawl spaces requires pressure dynamics," Prill says. "You could be sucking in fumes from a manufacturing area, a crawl space or a 160-degree attic. People smell mold, and they demand testing. All you may have to do is keep the crawl space pressure negative relative to the building, and they won't smell it."

Prill packs these and his other IAQ tools — including moisture meters, particle counters, CO and CO2 meters, temperature/humidity testers and communication materials — into a single shoulder bag.

If you're in HVAC, you're already in IAQ

Proper design, maintenance and operation of HVAC systems are essential to indoor air quality. IAQ factors controlled or influenced by HVAC include:

- Temperature and Humidity
- Outside air exchange
- Air pressure in spaces, and direction of flow (clean to dirty)
- Air filtration and airborne particle levels
- Distribution and flow of conditioned air (avoiding drafts and dead spots)

Another essential tool is diplomacy. When Prill enters a school system to teach air quality, he knows that many people, from school board and superintendent to the facilities manager and school custodian, may feel threatened by what they are about to hear. "It could involve a union grievance or a potential lawsuit," he says. "When you get there, the maintenance guy or gal may feel that you're going to make them look like they haven't been doing a good job. So what I do is try to convince them that I've got practical solutions, and that it's better to find the problems before they find you."

What gets measured, gets fixed

Once accepted into the schools, Prill tours the facilities with staff members to see if the school meets five benchmarks of good building management. Buildings should be:

- Dry
- Clean
- Comfortable
- Free of pollutants
- Properly ventilated

Measurement is essential. Whether checking for roof-leak moisture, spanking carpets to assess dust levels, ensuring air flows from hallways into locker rooms or measuring CO2 levels to gauge fresh air exchange, Prill relies on hard data.

"Without benchmarks, how do you know what you're doing?" he asks. "If you have a particle counter, for example, you can say 'I don't want more than X amount of particles in my schools. If I get more, I'm going to petition for extra cleaning help.' Without that, it can get dirtier and dirtier and people get used to it."

As Prill says, "Measurement translates into accountability. What gets measured gets fixed."

When clients learn to face up to their IAQ problems, the reward can go far beyond a paycheck. Take the case of Prill's biggest challenge, a trouble-plagued school in a small Washington State school district.

After spending eight years trying to solve its indoor environmental problems, and though the community could hardly afford such a radical solution, many townspeople were ready to tear the ten-year-old school down. National experts and health department officials at county and state levels had tried to solve the problems, at a cost of some $750,000.

Though some advised him to steer clear of what looked like a no-win problem, Prill got involved. "You don't solve an eight-year-old problem over night, but we fixed it," he says. "There were some practical things that still weren't fixed. Air was going from dirty to clean, and we fixed that. The carpets were filthy, in spite of the fact that they looked clean. We found some moisture in the walls from water leaks. Fans that were running, but they weren't moving air.

"We helped them set up a timetable with reasonable expectations," Prill continues. "We helped them set up a communications process. We set up benchmarks: you'll know this is fixed, when such and such happens. We didn't find any real smoking gun, but we solved the problem. They even won an award."

Adding value

Technical knowledge and problem solving are musts for an IAQ specialist, but Prill says it's also important to pay attention to communications, public relations and marketing.

"A lot of IAQ specialists aren't going to problem buildings. Hopefully they're going to be providing a routine service," he says. "You just can't show up and slap your ladder up to the side of the building, monkey around, drive off and send in a bill.

"You have to do some education. Give the customer a fact sheet to explain what measurements you've taken, what you found and what it means. Otherwise they're going to say 'well, what am I paying for?'"

Do your homework on the basics, Prill advises, and if possible, enter into an apprenticeship with a professional in the IAQ business. Much excellent information on indoor air quality is available, but in Prill's opinion, much of it is far too detailed to be practical. And for Rich Prill and his IAQ customers, practical is a very important idea.

For a sample customer fact sheet and detailed how-to information on indoor air quality, visit www.fluke.com/IAQ.

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