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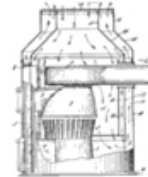
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The First Affordable Modern Home Furnace and Start of a Legacy

By Richard L. Pasquesi, Chapter Historian, 2019-20

If you venture into older midwestern homes, you'll often find a furnace called an "octopus": the invention of one William J. Doyle. The inventor of this heating system held more than 20 patents and revolutionized how middle-class Americans heated their homes. Previously, only the wealthy could afford heating systems with radiators. The "Everyday Joe" was forced to use a wood-burning potbelly stove: a far dirtier and less efficient technology that put coal or wood, as well as the resulting ash, in the home's occupied spaces. Doyle's "pipeless furnace," as it was known, was a gravity hot-air heating system. It allowed the heater, fuel, and ash to be moved into the basement. An example of this influential furnace was once displayed at the Smithsonian.

1,246,901. FURNACE. WILLIAM J. DOYLE and JEROME J. WOLLENBRUFF, Cincinnati, Ohio, assignors to The Monitor Stove & Range Company, Cincinnati, Ohio, a Corporation of Ohio. Filed Mar. 23, 1915. Serial No. 16,482. 2 Claims. (Cl. 126-99.)



William Doyle was also very involved in the American Society of Heating and Ventilating Engineers – then called "ASHVE," since air-conditioning hadn't yet become an integral part of building systems technology.

The Doyle legacy of building systems innovation continues with William's grandson Dan Doyle, who was recently named a Fellow of ASHRAE. During his 40-year career as an ASHRAE member, Dan has made countless contributions to the practice of HVAC design, touching the lives of hundreds of engineers, contractors, owners, and tenants in Chicagoland and North America.

Dan has spent his entire engineering career at Evanston-based Grumman/Butkus Associates, becoming Chairman after serving as company President for 13 years (2001-14).

Beginnings

Dan, an Ohio native, displayed an early interest in the environment. As a high schooler, he co-founded an "Ecology Club," which started a large recycling program. He and his classmate, Dave Busken, routinely drove around Cincinnati in a Busken Bakery truck, collecting castoff glass, steel, and aluminum and delivering it to places like the Cincinnati Cullet Co. for recycling. Environmental initiatives were prominent in the U.S. at the time; the country was still recovering from the oil embargoes of the 1970s, and people were increasingly concerned about energy use and pollution.



Dan was encouraged to attend the University of Illinois at Urbana-Champaign by a high school friend, Bill Bahnfleth, who was already studying engineering at UIUC and who would later become the international president of ASHRAE (2013-14). (The university also held a family connection: Larry Doyle, Dan's uncle, had been the head of the UIUC Industrial Engineering department and had retired in 1975, shortly before Dan enrolled.)

Dan first became interested in HVAC engineering while working a summer job for a Cincinnati-based AE firm, AE Design Associates (a division of Pedco). The company employed about 200 people working on a single floor in a sea of drafting tables. Dan did his drafting on mylar sheets, hand-lettered all his drawings, and wrote correspondence and specs on a typewriter. He recalls a smoky, "Mad Men" vibe and says he always dreaded visits from his boss, who typically carried a stogie with a big ash hanging off the end. If you were so unfortunate as to have that ash fall on your drawings, says Dan, you'd quickly find it becoming part of your design.

Dan's direct manager at AE Design, Bud Platt, had previously worked for Don Bahnfleth (ASHRAE President 1985-86, and Bill's father). Bud encouraged Dan's interest in ASHRAE. In fact, Dan skipped the "student" stage and became a full-fledged ASHRAE member while still in college.

During his senior year at UIUC, Dan was a student of Professor Will Stoecker, author of the *Industrial Refrigeration Handbook* (published in 1998 and still in print). Stoecker knew Dan was interested in an HVAC career in the Chicago area, and he provided a list of about 20 engineering firms to target for interviews during spring break. Dan landed meetings at more than a dozen firms, including ESD; GKC; Schmidt, Garden, and Erickson; and Kroeschell.

At ESD, Dan was set to meet with VP Bob Ladner. The day of the interview featured "crummy" spring weather, and Dan visited the rest room first to compose himself. Washing up, he met an older Indian man who seemed friendly. Looking for an inside perspective, Dan asked him, "What's this place like?"

"Well, I think it's pretty good," the man replied.

Only years later did Dan find out that he'd been speaking to Hem Gupta, who had founded ESD in 1967. Though he ultimately ended up elsewhere, Dan appreciated how well he was treated by Bob, Hem, Ian Caloger, and leaders at other firms during the interview process.

On the last day of spring break, Dan had interviews with two companies that were polar opposites in size and mission. The first was Amoco (Standard Oil of Indiana), which offered him a lucrative financial package but also a heavy travel schedule. Dan next met with Dave Grumman and Al Butkus at Enercon: a three-person firm recommended by both Professor Stoecker and Don Bahnfleth. The company, whose name was based on "energy conservation," offered him \$100 a year more than Amoco. Dan accepted on the spot.

Dan graduated in 1980 from UIUC with a bachelor's degree in Mechanical Engineering. Graduation was on a Saturday, and his first day at Enercon was the following Tuesday.

A Young Engineer

At Enercon (soon to be renamed "Grumman/Butkus and Associates"), Dan's interest in ASHRAE continued to be nurtured. Founder Dave Grumman was already very active in the group and encouraged Dan's participation.

Dan soon discovered that a real-world engineering education was different from an academic one. "When you graduate from U of I, they tell you you're getting the 'best' engineering education," he recalls. "When I got out of school, I discovered how little I really knew about engineering. I would have to go into Al Butkus' office about every 15 minutes to ask him a question. Al was a guy who read ASHRAE handbooks during his commute, so when I'd ask him a question, he wouldn't even look up. He'd just tell me the answer was in Chapter 36, page 5. And it was there every single time!"

Eventually, Dan learned to seek answers on his own. "You don't want a guy spending three hours looking for something, but you don't want to go ask the boss before you've spent some time looking for the answer." Attendance at ASHRAE meetings was part of Dan's method for finding answers.

During his early days at G/BA, Dan was introduced to Jack Cooper, a future ASHRAE chapter President, who suggested that Dan get involved in the chapter's education committee. Along with co-members Tom McNamara and Kyle Schultz, Dan visited local schools, such as UIC, Northwestern, and Oakton, on ASHRAE's behalf. Many of these same institutions were also G/BA clients.

Shortly after joining the firm, Dan was told by his boss, "Get on the EI and find your way to the 'engine room' in the basement of the Jelke Building at Rush; find the clients and do this project." The inexperienced kid from small-town Ohio eventually located the job site, where the staff consisted of seasoned employees schooled by years of practical experience. Dan realized humility was in order, saying "I'm just here to work *with* you." As a result, the facility engineers accepted Dan and spent time training him. The moral of the story? "The guys in the engine room often know more than the consulting engineer. Though they may not know everything, there's a lot to be gained by listening and learning from people with practical experience."

New Technologies

In the early 1980s, Enercon was one of the few firms in the nation doing building energy modeling. Small personal computers were not yet part of the workplace, so when Dan needed computing power, he had to travel to Riverside Plaza in the Loop, home of University Computing. A half hour after feeding his keypunched cards into a mainframe computer, Dan would receive results, but he often found that a missing comma or period meant he'd need to start again. For several years, energy models were routinely done this way; sometimes, the G/BA team did manual calculations in the office using Air Force weather data for Chicago. Any sizing that was needed for ductwork or piping was done with manual tools (Ductilators and System-Sizers).

G/BA's first office computer was a TI-990 mini-computer by Texas Instruments. It was larger than a four-drawer filing cabinet, with two green monochrome terminals and a hard drive the size of a garbage can lid. In the early '80s, this equipment cost about \$40,000 – more than \$120,000 in today's dollars. A few years later, AutoCAD began making inroads.

Dan recalls one customer, Nate Steffan at St. Joseph's Hospital in Chicago, who wanted to try new technologies, assuming he could get funding for them. One day a salesperson visited the G/BA office claiming to be able to get more light from two 34W bulbs than four 40W bulbs by using a reflector. Keeping his adventuresome client in mind, Dan joined the salesperson in an impromptu experiment. Although they didn't get 100% of the light the salesperson claimed, they did get about 90%, and Dan shared the results with Nate. Nate then bench tested the reflector technology in numerous configurations, working until he "had enough information to write a thesis," Dan recalls. As a result, several lighting retrofits were implemented, decreasing St. Joe's lighting bills and cooling load. Other innovations included installing the first VFDs at this hospital, and recovering heat from hospital waste incineration to create steam. Overall, St. Joseph reduced its energy use by nearly 40% as a result of its collaboration with G/BA.

Becoming the Illinois ASHRAE Chapter President

Dan was eventually introduced to Lee Woods and Eileen Duignan-Woods, both of whom would later become ASHRAE Illinois Chapter Presidents; Eileen was the chapter's first female President. When Lee was chapter President, he asked Dan to co-chair the energy committee with future FE Moran President Mike McCombie, who ultimately also became President of the ASHRAE Illinois Chapter. While working on this committee, Dan met Tom Kroeschell and Bob Smeltzer, who were instrumental in starting the chapter's Energy Awards Program. (A fun fact: The awards competition was started in the ASHRAE Illinois Chapter and was later adopted by the larger society.)

Now in his late twenties, Dan was asked to become a member at large of the Board of Governors, eventually becoming the chapter Secretary. A decade into his career, he became President Elect and program chair. The latter, says Dan, was the most fulfilling position because he got to select subject matter and speakers that interested him most.

One memorable meeting was a 1991 controls seminar at Zum Deutschen Eck: a popular German restaurant that served family-style German food and pitchers of beer. The presenter, Doug Hittel, worked at the US Army Construction Engineering Research Lab (CERL) in Champaign. Doug was a very popular speaker at the time; 120 people signed up for the seminar. Mid-morning on the day of the event, Doug called Dan to report that he was too ill to present. Dan scrambled for a replacement, but to no avail. Late that afternoon, Doug felt better and called to say that he'd be able to make it but would be late, since he had to drive up from Champaign.

By meeting time, an extra 40 people had showed up, so there were 160 people in the room. To Zum Deutschen Eck's credit (and Dan's peril), the beer kept flowing. By the time Doug arrived at 7 p.m., the crowd was a bit rowdy but still willing to listen. Poor Doug even endured a few hecklers, but he responded cheerfully and the meeting was a success.

In 1992, Dan became chapter President. The swearing-in ceremony was held at Belmont Harbor in Chicago. En route, Dan and his wife went to drop off their 1-year-old son at the babysitter, who proceeded to cancel on them. There was only one option: The baby was coming along. Much to the Doyles' dismay, the baby was "not being very good," so during the entire ceremony, Dan had both the weight of the presidency and his son (literally) placed in his hands.

Later that year, the ASHRAE Winter Conference was set to take place in Chicago. Much to Dan's surprise, he found out a few days before the meeting that, as President of the host chapter, he needed to give a prayer at the opening plenary session. Panicking, Dan rushed to his church to see if his minister could help him write it. The minister wasn't in, but Dan was fortunate to find church member Chuck Klosterman, a retired minister. Dan explained ASHRAE's mission of energy conservation and building design, and Chuck helped him compose a "long prayer asking God to bless us to help the environment." Dan ultimately delivered an invocation for which he received complements for months to come.

In the year leading up to becoming chapter President, Dan was mentored by John McDermott, the current President. McDermott encouraged Dan to develop a theme for his Presidency; Dan chose "*Promoting Women in ASHRAE*." This initiative took two concrete forms:

1. Appoint only female committee chairs. (Some of the woman engineers appointed to the Board, or as committee chairs, that year included Karen Lindsey, Kathy Langeland, Jean Gibbons, and Leslie Phillips. Karen and Kathy would go on to become the Illinois Chapter's second and third female Presidents.)
2. Do away with the model hostesses that were a feature of the ASHRAE golf outing.

Every year, the flyer for the chapter's golf outing featured a header reading "GIRLS GIRLS GIRLS." Every year, models in skimpy outfits would ask attendees to make bets at par 3 holes, the proceeds of which would go to ASHRAE research.

During Dan's first meeting with the Board of Governors, he made a point of stating how inappropriate this tradition was. Not surprisingly, he met resistance. Some board members argued that the models were bringing in a lot of money for ASHRAE research, and that funding would take a hit if this aspect of the outing were scrapped.

Ever analytical, Dan asked, "How much money was raised for research last year?"

He was told, "About \$2,500; maybe \$3,000."

Then Dan asked the Treasurer, "How much did the models cost last year?"

After shuffling through the records, the Treasurer responded that the models had cost \$3,500. This practice was putting a dent not only in the chapter's image but also its bank account. Needless to say, the "model" tradition was immediately eliminated.

Becoming President of One of Chicago's Top Firms

Dan became President of Grumman/Butkus in 2001. One of his goals was making the firm competitive in the marketplace but collaborative and non-competitive as a workplace. Dan wanted G/BA to be a company where people looked forward to coming to work – a place where they'd be treated well. Under Dan's leadership, the only goal for growth was that it be sustainable so the culture and quality of work could be maintained.

As President, Dan worked long hours and never took much vacation. Now, after turning over the reins to Chad Luning in 2014, he's down to more manageable hours. He's able to take vacations and devote more time to outside professional activities. Today, Dan continues to hire the firm's technical staff and bring in new clients. He spends his free time with his wife, Glynis, and participating in various professional groups. In addition to his ASHRAE service, he has held numerous positions of responsibility with I²SL, the International Institute for Sustainable Laboratories, which he currently serves as Chief Financial Officer.

"I'm having a great time," he says. "I don't intend to retire any time soon."

Dan adds, "Looking back on my career in engineering, I don't think about the money made, or promotions or advancement or awards. Instead, I tend to think back most fondly on clients that I've worked with, salespeople, contractors, people at our firm, and the friendships I've built up over the years. That's what's most important."

Challenges: Looking to the Future

Dan foresees two key challenges for the engineering field.

"We still need to work on diversity in the industry," he says. "We've come a long way; when I graduated from U of I we had a graduating class of 230 people in mechanical engineering and only four were women. I think we're doing better, but we still have a long way to go. The same goes for minorities. I think that we've actually made better progress with increasing the number of women in engineering than we have with attracting minorities to the field. We still have a long way to go. We need to take more concrete, bold actions to make it happen."

Also weighing on Dan's mind is climate change. "That trumps all other issues; we won't be talking about jobs in our industry or diversity if we don't immediately start doing a lot more than we're doing now. I worry about that a lot. I got into this industry because of my strong feelings about the environment, and I still feel that way, though my response has changed over the years. Back in the day, you became an environmentalist because you didn't like pollution, or you wanted energy independence in case of an embargo, or you were working to save your clients money. When climate change research came along, that was a game-changer. We should realize that we're now fighting for survival. Buildings are the largest source of energy consumption and carbon emissions in the U.S., so we have to do something about that, or there won't be anything to talk about in 30 years."

On Quality and Lessons Learned

Dan learned over the years that problems always come up on jobs. "People's natural inclination is often to deflect blame to other parties and cover yourself, then hope that someone else digs into the problem and solves it. Then you spend a lot of time in meetings and writing emails, wasting a lot of time and money. We've learned over the years that the right course is to start digging and run to the problem; don't run away, don't blame."

For example, Dan cites a job involving a client that had two chillers with pumps that would shut down at about 85% flow. The sales rep and commissioning agent immediately started blaming Dan's team for mis-sizing the pumps. G/BA's project manager then pointed out that G/BA had specified a non-overloading pump. Ultimately it was determined that the pump motors had been wired for 50 Hertz at the factory. G/BA sent two senior people to the job site for an entire day to figure this out. Though this was somewhat expensive, the problem was fixed quickly instead of becoming a weeks-long process that wasted the time of everyone involved.

In Dan's opinion, construction schedules have become compressed over the years, partially due to advances in technology, partially due to owner demands. Standardization has increased, which has improved uniformity and quality. However, there's a temptation to issue cookie-cutter designs, which can reduce innovation and creative problem-solving. Integrated project delivery has eased the traditionally confrontational relationship between the design team and construction team – which is a good development.

Dan has noticed that, in general, there is not enough focus on training, and there is a tremendous “demographic bulge” of people his age who will leave the industry in the next five to 10 years. That's why, in his opinion, it's important that owners, contractors, and engineers all encourage participation in organizations like ASHRAE, which constantly offer training opportunities. ♦