Women in Plumbing Engineering [Part 1]

by Jim Camillo

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In the first installment of an exclusive roundtable series, these women explain how they came to the profession and the daily fulfillment it offers them.

On the Web site www.engineeringwomen.org, there's a section titled, "Extraordinary Women Engineers." Many specialties (including architectural, building, civil, mechanical, construction) are represented, but not plumbing. With this article, *PM Engineer* hopes to change that.

Although still small, the number of women plumbing engineers is growing. Those interviewed for this article represent a wide spectrum of their profession. They work for large and small engineering firms, as well as retail and manufacturing companies. Some are veterans, while others are relative newcomers. And they come from every region of the U.S.

***Part 1* of this roundtable interview focuses on the different paths these plumbing engineers took to reach their present positions, as well as their most memorable career highlights and skill specialties. *Parts 2* and *3* of this series will run in future issues of *PME*.**

Feedback from women plumbing engineers not interviewed is strongly encouraged.

What led you to become a plumbing engineer?

Bowman: I began in this industry while I was still in college. My now husband worked for a small architectural firm in Southern California and they needed an engineer to do in-house design for their assisted living and skilled nursing facility projects. I then decided to leave that firm for a small mechanical engineering firm to further my experience and skills. My husband and I decided that it was time to return to Northern California where I obtained a position at Capital Engineering.

Johnson: Prior to my current job, I was the purchasing supervisor and capital projects manager for Southeast Wood Products. My responsibilities included capital improvements and plant purchasing. I worked in conjunction with maintenance for more than six years and managed $50 million of capital improvements at multiple facilities. Through my experiences there, I knew I wanted a career active in construction, preferably involving understanding how things work and making them work well. This realization, combined with my mathematics proficiency, inevitably led me to an interest in plumbing engineering. When Southeast Wood was purchased, I decided it was a good time to change fields and pursue that interest.

Wengender: I have always been interested in calculating and designing so I majored in mechanical engineering in college (B.S. degree). My first engineering jobs mostly involved collecting data and quoting codes. I was interested in a field where I could see

my work being built, so I pursued a career change into the construction industry. When I was hired here, I had no experience in plumbing design — but I had experience with building codes, health department compliance and dealing with contractors, so the transition was not difficult. Initially, I did both plumbing and HVAC design. Our firm decided to have engineers more specialized by discipline and I eventually was designing plumbing and fire protection exclusively.

Thomas: After high school graduation, my drafting instructor asked if I would be interested in an entry-level job for a local engineering firm. My first assignments included making prints, running errands and manually drafting templates (which consisted of tracing multiple floor plans for the designers to use). Soon after, the plumbing designer left so, by default, I became the "up and coming" plumbing designer/drafter (mostly drafter). I worked for several years with an experienced plumbing designer until I left to accept a design position with another firm. I gained more experience with two other engineering firms and have been in the plumbing design field the entire time.

Torborg: I've wanted to be an engineer since I was a junior in high school. In college, I learned about fluid flow and thermodynamics, but the focus was on HVAC. My exposure to plumbing engineering was in my second job after graduating from college. I worked for a mechanical consulting engineering firm, where I designed the HVAC and the plumbing systems. I found this very exciting because the end-user actually used the fixtures I specified. While working for the mechanical engineering consultant, I designed the plumbing systems for several correctional facilities. I learned about the challenges of designing plumbing systems with varying degrees of vandal-resistant construction.

Balz: Growing up I would watch my father, who would fix water main breaks and check in on the sewage treatment plant. I wanted to be an architect, but my high school guidance counselor recommended I go into architectural engineering since I excelled in math and science. During college I took an internship with a plumbing contractor. I liked it, but I wanted to try the general contracting side, so I took a different internship. When I graduated I turned down the general contractor and decided to put my degree to good use and work for an engineering firm. I am still there.

Hunter: I started my career in the plumbing industry in the brass machining and assembly division of Mansfield Plumbing Products in 1977. I was eventually promoted to QA technician and worked closely with product engineers testing new products, implementing changes to existing products, etc. I saw how they were able to take new products from concept through development and delivery to the customer. I was inspired to complete my mechanical engineering degree and, in 1995, was promoted to product engineer, working mostly in the vitreous china division. I remained there until 2001, when I joined Gerber as manager of product development for the vitreous china division.

Kocherhans: In college, I learned a lot about the different fields of engineering and graduated with an associate degree in drafting and design technology. My first real job in this field was with an HVAC engineering firm in Salt Lake City as a draftsman where I learned much about the design of HVAC systems. When two of the engineers left the company to start their own firm, I went to work for them. During this time, I started to design plumbing systems and later earned my CPD. Years later I became junior partner in their firm. Our company has since merged with another, but I'm still a plumbing

designer.

Enriquez: While in engineering school in the Philippines, I worked for a well-known sanitary engineer. Sanitary engineers there are responsible for designing plumbing and fire protection. Doing well on professional engineers tests landed me a job at a famous A/E consulting firm in Manila. After four years there I headed up the plumbing group of an American-based company for three years, then decided to start my own consulting firm.
Eventually, I came to the United States due to political unrest during the Marcos regime. Since then, I've worked for several engineering firms, as well as a design build contractor firm. Currently, I'm the plumbing group discipline leader for a Los Angeles firm.

What have been the highlights of your career to this point?

Bowman: The biggest one in regards to design is learning how to size and route medical gas. Medical gas is a very important piece to a hospital and it needs to be sized and routed correctly. If it is not, lives can be at stake. The other big highlight is being elected as the first woman President for the Northern California Chapter of ASPE. I am very honored to have this position and that the membership trusts me with this responsibility.

Johnson: To acknowledge only a handful of projects as career highlights is difficult. In 12 years, I have worked on schools, cancer centers, emergency rooms, vivariums, surgery centers, water treatment plants, waste water treatment plants, industrial facilities, magnificent churches, and buildings that have changed the city skyline. But to acknowledge personal highlights is not difficult. One is a booster pump system replacement for a military hospital that started up without the general facility users realizing their domestic water pumps had even been replaced. Another is being inspired while surveying an active dialysis unit and understanding the impact our designs have on others.

Wengender: I enjoy this career because of the variety of tasks I get to do daily, and I especially like seeing the buildings we design finalized. During a typical week I spend some time in the field reviewing existing conditions; some time at my desk doing calculations and designing/drafting; I meet with architects, clients, contractors and code people to review plans; and I get to see projects complete. The variety of tasks required for this industry is what keeps it interesting. We keep in touch with many clients and it's good to hear that the buildings we design function as we intended.

Thomas: The professional highlight of my career was passing the CPD exam offered by ASPE on my first attempt — closely followed by passing the National Institute for Certification in Engineering Technologies in automatic sprinkler system layout. I also enjoy watching a design go from a "piece of paper" to an actual building. My personal highlight took place during a field visit to the University of Tennessee. I was on the lower level of their arena taking measurements for proposed renovations when I met Pat Summitt, head basketball coach for the Lady Volunteers, and the entire team before they won the national championship.

Torborg: I've had several opportunities to get involved with training and teaching

others about engineering. This past year, we invited high school-age daughters of Target team members to join us for a day at Target where we discussed "Women in Engineering." We gave students a broad picture of different engineering careers. I was part of a panel of speakers that talked about our careers and how we became engineers. The kids were excited about engineering at the end of the day. I hope we inspired at least one, if not more, of the girls to pursue a career in math and science.

Balz: I can think of two recent highlights in my career. I worked on a research facility that required the use of a biological decontamination system. It was interesting doing the research and the modeling needed to determine the kill tank volumes and the holding capacities needed.
The other highlight is having the opportunity to work jointly on a massive project in the Middle East with two other engineering firms that we would typically compete against. I learned to work with different companies and cultures and that not all countries look at things the same way.

Hunter: The biggest highlight would have to be the day I reached my goal of becoming a product engineer. Second would be my contributions to improving the overall quality and function of Gerber vitreous china products in the last seven years. Third would be seeing Danze vitreous china introduced at the 2008 Kitchen and Bath Show in Chicago.

Kocherhans: Becoming a junior partner in a firm I worked for was probably the most exciting thing in my career. Although it only lasted a couple of years before we merged with another company, it was nice while it lasted. My involvement in ASPE and my work has taken me to different cities and I have met many people throughout my career. Passing the CPD exam and obtaining my CPD designation through ASPE was something I think really helped me in my career.

Enriquez: The real highlight of my career was when I was elected as president of the Los Angeles Chapter of ASPE. To me this meant an acknowledgement from my peers of my technical capabilities as an engineer. It also gave me the confidence to represent the Los Angeles plumbing engineering profession at regional and national levels. Currently, I'm the lead engineer for a 620,000 m² of mixed-used beach resort development in Abu Dhabi, United Arab Emirates, and the Los Angeles County Museum of Arts. In addition, I'm the lead plumbing engineer for several Kaiser Permanente Template Hospitals, the design of which will form a template for subsequent full designs of 13 hospitals in California.

Do you have an area of specialty at your firm? If so, how did you come to it, and what do you enjoy most about it?

Bowman: If I have an area of specialty, it would have to be healthcare design. I have been in the healthcare field for more than eight years. Designing systems for hospitals and other healthcare facilities requires an engineer/designer to know all the code requirements and the right questions to ask the client in regards to what they want from their system. The plumbing system for a hospital is very large, intense and includes everything from typical plumbing systems to medical gas.

Johnson: Our firm prides itself on customer satisfaction. We have a wide range of design experience. However, if I claimed a specialty it would be fire protection,

medical/lab and industrial design. The skills I acquired in my previous industrial position, coupled with those of my current position, have built a wealth of knowledge over the last 18 years. I enjoy coming up with a good solution to a difficult project and knowing the clients are happy.

Wengender: The architectural and engineering firm I work for has always specialized in health care, K-12 schools, as well as a variety of municipal type buildings. Being the senior plumbing/fire protection engineer in my firm, I am involved in almost every project. I enjoy having a variety of systems to design. Health care systems include medical gas and other specialty piping systems. School work often involves large kitchens, locker rooms, science classrooms and other plumbing-rich areas.

Thomas: I design HVAC but my specialty is plumbing and fire protection for commercial, educational and institutional facilities. I have been CPD certified for 12+ years and NICET certified for five years. The sprinkler specialty came due to the progression of detail required by the local AHJ. This required extensive research of codes and design books. I began by adding more detail to each project. I soon became the "sprinkler" person of the office.

Torborg: Part of my job at Target allows me to partner with our facilities management group to solve plumbing problems in the stores after they are open. I pay attention to regional issues, as well as store-specific situations. I enjoy the partnership between engineering and facilities and continue to look for ways to build relationships between the two groups.

Balz: I work in a lot of different market segments, but I guess you could say my specialty is in laboratory design — the design of chemical and biological laboratories and vivarium facilities to support research. I have been doing these types of buildings since I started working for AEI. No two laboratory or vivarium buildings are ever the same. There is a vast variety of research being done in the world and it is constantly changing.

Hunter: I have been involved in the development of vitreous china plumbing fixtures since 1995. There are so many variables in the materials and processes that every day is a challenge. I think my QA background, working with codes and standards, and manufacturing experience gives me a unique view when it comes to product development. I see product development as a continuous process from concept to product launch — not individual tasks passed from one group to another.

Kocherhans: Our firm does a lot of work for universities and other schools so we are involved in projects that have many different applications. For the last couple of years I have been designing large kitchen projects and laboratories. Our firm also does quite a bit of work for the LDS church, and a lot of different types of projects like ski resorts, condominiums, office buildings, etc., so I design many types of plumbing systems.

Enriquez: I would consider healthcare and fire protection systems design my area of specialty. I worked on a couple prestigious health care projects in the Philippines: The Heart Center for Asia and the Philippine General Hospital. In the United States, I have worked on health care projects like the Martin Luther King Trauma Hospital in Los Angeles; El Camino Hospital in Mountain View, CA; and the UMC Cancer Treatment Center in Tucson, AZ.

Angela Bowman

Angela Bowman works for Capital Engineering Consultants, Inc. in Rancho Cordova, CA, as an engineer. She joined Capital Engineering in Nov. 2004 as part of the health care team. Bowman started her career in 2000 by designing systems for assisted living and skilled nursing facilities. In addition, she is the president of the Northern California Chapter of ASPE and the first woman president for the chapter.
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Carol Johnson, CPD

Carol Johnson, CPD, is senior plumbing and fire protection designer for Whitaker and Rawson, Inc., which was founded in May 1996. Johnson joined the team in May 1997. Since then the firm has grown from 6 to 25 employees. Her responsibilities include plumbing and fire protection in a wide range of buildings, including medical, industrial, educational, research, and commercial facilities, churches, stadiums and various other building types.
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Jennifer Wengender, P.E.

Jennifer Wengender, P.E., has worked for Clark Patterson Lee, an architectural and engineering firm, for the past 10 years. She is the senior plumbing/fire protection engineer at the firm and has been in the engineering field for 18 years. Prior to joining Clark Patterson Lee, she held several engineering positions in manufacturing and health care fields. She is the current president of the Rochester Chapter of ASPE. Wengender received her professional engineering license 8 years ago and has a Bachelor of Science degree in mechanical engineering.
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Penny Thomas, CPD, CET

Penny Thomas, CPD, CET, is a project manager for Community Tectonics Architects, a full-service architectural and engineering firm located in Knoxville, TN. Thomas has been with this firm for three years, but she has worked in the plumbing design profession for more than 20 years. Also, this year she is serving as the president for the East Tennessee Chapter of ASPE.
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Renae Torborg, P.E.

Renae Torborg, P.E., is a lead mechanical engineer for Target Corp. in the property development pyramid. She's worked at Target for almost 4 years designing the mechanical systems for new and remodeled Target stores. Prior to joining Target, Torborg had 10 years experience as a mechanical engineering consultant in St. Paul, MN, and for a mechanical construction contractor in Fargo, ND. She has a Bachelor of Science degree in mechanical engineering from North Dakota State University.
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Sarah Balz, P.E., CPD, LEED AP

Sarah Balz, P.E., CPD, LEED AP, is a piping project engineer for Affiliated Engineers, Inc. (located in Madison, WI), and has worked with the firm since 1996. She specializes in the design of plumbing, specialty gas piping, and fire protection systems for research and development projects. Her clients are primarily pharmaceutical companies and institutions of higher education. She has a Bachelor of Science degree in architectural engineering from the Milwaukee School of Engineering.
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Susan Hunter

A degreed mechanical engineer, Susan Hunter has spent her entire professional career in the ceramic industry. Currently, she is the vitreous china (VC) manager of product development for Gerber Plumbing Fixtures LLC and Danze, Inc. For the past seven years, she has worked intimately with Gerber and Danze VC product managers and executed their concepts from development to the finished product. She is also responsible for making sure all products meet the applicable industry standards.
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Suzanne Kocherhans, CPD

Suzanne Kocherhans, CPD, works as a plumbing designer for Heath Engineering, a consulting engineering firm located in Salt Lake City, UT. She has been with Heath for five years, but has worked as a mechanical/plumbing designer for 17 years. Her responsibilities include the design of waste, vent, water, gas, compressed air, laboratory gases, and other specialty piping for commercial buildings and some residential. Kocherhans is currently serving as president of the Intermountain Chapter of ASPE.
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Vivian Enriquez, CPD

Vivian Enriquez, CPD, is an associate and the plumbing group discipline leader in the Los Angeles office of Arup North America Ltd. She has more than 30 years of plumbing and fire protection experience on a wide range of projects, including high- and low-rise buildings, mixed-used developments, hotels, schools, universities, healthcare, theme parks, recreation centers and museums. She has a Bachelor's degree in civil and sanitary engineering from Manila, Philippines. Contact: vivian.enriquez@arup.com.

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