THE WATER WORKS

CANADIAN ENGINEER GRAHAM NASBY ENJOYS IMPROVING THE LIVES OF THOSE AROUND HIM, SOMETHING HE DOES EVERYDAY.

By Richard Massey

GRAHAM NASBY IS AN INDUSTRY-RECOGNIZED LEADER in the water/wastewater community for his efforts with DCS/SCADA (distributed control systems/supervisory control and data acquisition) systems, standards development, raising cybersecurity awareness, and alarm management. Through his work with the International Society of Automation (ISA) and IEC, Nasby has co-authored international standards in alarm management, cyber security, and HMI (human machine interface) design. He has also worked with the ISA, American Water Works Association, Water Environment Federation, and other industry groups to author numerous articles on SCADA best practices, led the annual ISA Water/ Wastewater and Automatic Controls Symposium, and contributed to other industry events.
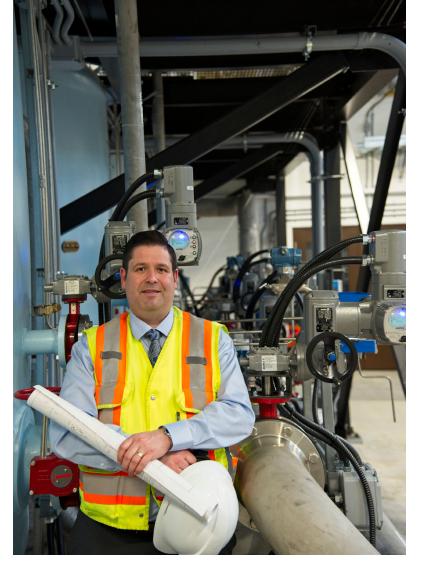
Nasby is responsible for the long-term planning, design, construction/ implementation, and commissioning of the automated control systems for the City of Guelph Water Services in Ontario, Canada. Before he joined Guelph, he worked for various consulting engineering firms where he provided project management and alarm management services for a variety of industries.

C+S Engineer magazine caught up with Nasby via phone and email this spring. This is what he had to say.

C+S: You have a background in cybersecurity awareness and alarm management. As it pertains to water/wastewater, what's the issue?

Graham Nasby: Computerized systems are one of the ubiquitous realities in any modern water utility. We use computers for billing, customer management systems, work planning, reporting, and water plant control systems, not to mention day-to-day office applications such as Word, Excel and email. Without properly functioning computer systems, it is simply not possible to effectively operate. In many ways, looking after cybersecurity is like purchasing life insurance to protect your family. You don't realize how much you need it until it's too late. Water utilities need to do a better job of protecting the computer systems that enable them to keep the business operating and the water flowing.

Alarm management is all about using your plant control system to improve operational effectiveness and reducing overtime costs. Like any process industry, modern water plants have sophisticated automatic control systems that look after many details, so that operators can focus on more important tasks rather than just spinning valves and starting/stopping pumps. The purpose of an "alarm" is a notification that is supposed to interrupt an operator, in order to divert their atten-

Graham Nasby, P.Eng. at one of the City of Guelph's newest water treatment plants (Guelph, Ontario, Canada). *Photo by: Andrew Toms*

tion to something that must be investigated and acted upon right away. Whether an alarm is used during the day shift or via an after-hours call out system, we need to take the time to properly design the alarm notifications so they only interrupt our plant staff in situations that truly need a timely response. Too many alarms lead to operator fatigue and higher overtime costs. Too many alarms are also a symptom of a plant or an automated control system that is not working well. Operators who get used to having to "ignore" a lot of alarms become complacent, and often won't respond appropriately when a truly abnormal event is communicated using an alarm. Want to know more? Take a look at the ISA-18.2 alarm management standard and books by Bill Hollifield and D. H. Rothenberg.

C+S: Human/Machine Interface: In a nutshell, tell us about the future of this technology.

GN: The HMI, or Human Machine Interface, is the set of computer screens that operators and engineers use to interact with automatic control systems. In the old days, the HMI was usually located in a plant's centralized room and the screens were hard to read. Old HMI technology was also expensive to install and difficult to update. Nowa-

days, we are starting to find HMI screens located throughout the plant, and operators using tablet and mobile devices to monitor and control the process control system. Where in the past HMIs usually had only single monitors, we are now also starting to see workstations with 2, 4, 6 or more LCD monitors that make it easier for operators to maintain situational awareness and monitor process trends before systems stray into abnormal and/or trip conditions. On the software side we are also starting to see better graphics and the use of better, more sophisticated, automatic control algorithms. Interestingly, a few years ago there was a movement to move to more photo-realistic and 3-D depictions of process data on screens, but industry research over the past 10 years has found that using more simplistic icons, built-in graphs, and reserving bright colors for alarms, actually makes systems easier to use and reduces operator fatigue. Further reading can be found in resources like the ISA-101 standard, the HMI Handbook, and publications by the ASM.

C+S: You have done just about everything someone can do within the water/wastewater industry. Tell us about your schedule. How many hours a week do you work, and how many miles do you travel in a year?

GN: I'll be honest: I don't watch much TV these days. I'm fortunate to have a very loving wife and a great team to work with at my day job. I am also fortunate to have a large network of contacts from around the world, which I keep in touch with through my work with non-profit technical associations and various international standards committees. Though I do try to attend a few conferences each year, a lot of my correspondence is done digitally these days. It's incredible the sheer number of folks that one can keep in touch with using conference calls, Skype and email. I do travel to a few face-to-face meetings for ISA and IEC standards committees, but all of this has to be fit around the work I do at the water utility. Speaking of keeping the water on, I usually get up at 7am most mornings (I am not a morning person), walk to work, and then begin the adventure that comes every day with operations at a public drinking water utility. As I said, I have a great team to work with and that is what gets me up every morning.

C+S: Industry articles, technical articles, conference papers, newsletters, blogs, and standards reports. You are a prolific writer. When did you develop your love and talent for the written word? How has writing enhanced your career?

GN: Writing was not something that naturally came to me. It is something that I have had to work at over the years, but amusingly I have found that the more I write the easier it gets. I see my writing as a way I can give something back to the profession that I work in. From the many textbooks I own, magazines I read, and conference papers I've reviewed, I have been able to assemble a great deal of knowledge and experience that I bring to the water utility and can share with the people I work with. I see writing new material as a way to give something back in return for all the great resources that have helped me develop my career.

C+S: Presentations, webinars, seminars, panelist, and moderator. You obviously have no fear of crowds. How did you develop your ability to

stand and deliver in front of your peers? Was this natural, or did you put a bit of work into it?

GN: Other than school presentations, the very first time I gave a technical talk was at an international water conference back in 2011. At the time I was working for a consulting engineering firm, and I had just finished my first control system upgrade project for a municipal client. I had never presented at a conference before but I had a feeling that my client at the time wouldn't mind a trip to St. Louis, so he and I convinced our bosses to let us travel to the 2011 ISA Water/Wastewater and Automatic Controls Symposium. I can't begin to tell you how many hours we spent practicing our talk and editing the paper. We must have done something right, for we actually won the prize for best paper. Since then I've never looked back. Ironically, it was that same co-presenter who hired me to come join him at the water utility four years later.

C+S: You serve as the Water SCADA & Security Specialist for the City of Guelph, and you also have your engineering and computer science degree from the University of Guelph. Located about 62 miles down the road from Toronto, Guelph is consistently ranked as one of the best places to live in Canada. Tell us something interesting about Guelph that only a local would know.

GN: Because I'm an engineer, I – of course – like trains. So, it's only fitting that I live in a city that owns its own railway. Not only does Guelph own the Guelph Junction Railway, the railway is self-sustaining and turns a profit for the city every year.

C+S: You did a lot of the "dirty work" in the central IT department while a student at UofG. What did you take away from that experience?

GN: Yes, when I was doing my part-time engineering degree at the University of Guelph, I did a lot of work for the school's central IT department. With over 37,000 user accounts and 100-plus supported software applications, the university's central IT department was a big machine that required an army of professional staff, and several part-time employees like me, to keep it running. My main takeaway from IT was that keeping any type of large system up and running takes a lot of work, investment, and careful planning. I enjoyed my time working in IT, but as I got further into my engineering studies, it soon became apparent that the engineering and construction profession was a better fit for me. I do appreciate the work that the folks in IT do, I'm just happier when I can leave it them.

C+S: In addition to your work with water/wastewater, you also play the clarinet for several bands and orchestras. How long have you played the instrument, what's the role of music in your life, and what style do you most like to play?

GN: I started playing clarinet back in Grade 7, as part of the local school board's standard music program that required every student to give playing an instrument a try. Because my last name started with a letter later in the alphabet ("N"), this meant that most of the "cool" instruments (trumpet, saxophone, trombone, etc.) where already taken by the time I got to choose. I got what was left: the clarinet. However,

the clarinet soon turned out to be pretty cool too, after I found out about great players such as Benny Goodman, Artie Shaw, Avrahm Galper, Simeon Bellison, and the like. Over the years, I have been fortunate to have had several good teachers, both in school and via private lessons. Playing clarinet in community bands and orchestras is something that I continue to do to this day. In fact, I met my wife in an orchestra – she was the oboe player who sat in front of me in the university's student orchestra.

C+S: You are a tour leader with MS Bike Ride for Multiple Sclerosis. What led you to support this organization?

GN: Growing up, I had an aunt who was diagnosed with MS in her early 30s. Over the next 30 years, I unfortunately got to see firsthand the progressive symptoms of the disease which ultimately led to her passing in 2012. At the time, the consulting firm I worked for had put together a team for the MS charity bike ride, so I thought it was only fitting that I get involved to help raise funds towards finding a cure. The ride is something that I try to do every year, rain or shine.

C+S: You are a recognized industry expert with all the accolades that come with it. What keeps you humble and hungry?

GN: I consider engineering to be a profession of service and collaboration. What engineers do is take science and technology and apply it to solve problems for the betterment of society. We also spend a lot of time talking with stakeholders and other professionals to learn about society's needs, and develop potential solutions that can be built to address those needs.

Engineers like myself are always trying to think of how we can design things to be more efficient, cheaper to build, longer lasting, more robust, and easier to use. I see this as the never-ending engineering design problem, and one that provides many opportunities and rewards along the way. In my view, the mark of good engineering work is delivering projects that enhance the quality of life for the people around you. I get to do this every day. Why would I stop now?

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