# Gordon Andrews, P.Eng.: Ethics by the book

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Barbara Elve, UWGazette

by Karen Hawthorne

**Gordon Andrews, PhD, P.Eng., has devoted his life to upholding the ethics of the engineering profession—and instilling all that he has learned throughout his career to his students—starting no later than day one in the first semester.**

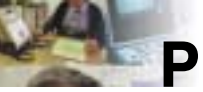
"I've been quite determined to get across the idea that ethics is important," says Andrews, on the phone from his office at the University of Waterloo where he has taught mechanical engineering for 33 years. He has taken early retirement this spring, but will stay on as an adjunct professor.

Over those years, he's really put the "professional" in professional engineering, producing some 100 publications, receiving a Best Paper Award for his work on vector network theory, and co-authoring two textbooks. *Introduction to Professional Engineering*, which is widely used in Canadian universities, offers an historical perspective of ethics in the profession. The text includes 10 case studies, beginning with the Quebec bridge collapse in 1907, to the 1992 Westray Coal Mine disaster in Nova Scotia and recent Bre-X mining fiasco.

## Risks of behaving badly

"We discuss the consequences of unprofessional behaviour," he says. "Everybody thinks it's just common sense. But the important thing is to look at what has happened in history. Usually everybody loses in these cases; there's usually a death and sometimes it could have been completely avoidable had you taken the right information and had the right attitudes. Sometimes you are haunted years afterward by a wrong decision. The fellow that designed the Quebec Bridge died a few years after (its collapse)."

His second book, *Canadian Professional Engineering Practice and Ethics*, is a final-year text that has been adopted by professional engineering associations across Canada for their professional practice exams. He's had phone calls from



students as far away as Belgium with questions about the text material in the wee hours before an exam.

"You have to get it across at an early age to students through formal lectures and the attitudes of professors right from the start," Andrews emphasizes. "In our program, we want them to know right in the first week, in the first term, the rules of the profession–that idea is conveyed in the first-year text and pervades the entire program. The expectation is that getting licensed and acting according to professional conduct guidelines is paramount for graduates heading into the workforce."

There is no doubt that Andrews is passionate about his work. He has a small private practice and has been involved in projects with numerous Ontario companies concerning engineering problems in machine design, dynamics (projectiles and vehicles) and gear train analysis. He has served as an expert witness in ethics-related court cases, and volunteered on PEO committees, including the Professional Development Committee and the Academic Requirements Committee.

"Engineering as a profession is ranked the same as law and medicine," he says. "It has the same reputation to uphold and I've done my part in filling in the gaps where they exist. I think the profession has been remarkably successful. You don't hear much about engineering malpractice or disciplining engineers like you do about medical doctors."

## Teaching at the heart of it

But Andrews is first and foremost a teacher–although he never actually planned his career as such: "My parents left it up to me to decide what I wanted to do. It was 1955, just after the Korean War, and I was quite determined to have a military career and be a military engineer."

He pursued a diploma in science from the College Militaire Royal de St-Jean in Quebec, and then continued his education in mechanical engineering at the Royal Military College in Kingston, Ont. Next up, he was stationed at a Canadian Air Force base in Penhold, Alta, near Red Deer, where he worked as a construction engineer by day–maintaining roads, runways, power plants, water and sewage treatment–and moonlighted as a base instructor. After his three-year service requirement ended, he headed to the University of British Columbia where he earned his master's degree, and met and married his wife Isobelle, who recently retired as program director for surgical services at the Kitchener-Waterloo hospital.

Andrews also worked as a stress analyst on the 727 and 747 design teams at Boeing in Seattle, Wash., before his foray into academe—determining the loads for the controlled surfaces of the jet wings, wing flaps, speed brakes and so on. "The 747 is still flying. It's been very successful," he notes. "And it was a great experience working there, the team spirit especially. There were 30 engineers on the control surface team and about 1000 engineers on the entire design team. That very practical experience has been applied to my teaching." At that time, his knack for teaching saw him instructing a night class in stress analysis to the designers at Boeing. Then his belief in continued learning propelled him to begin PhD studies at the Nova Scotia Institute of Technology, now part of Dalhousie University.

"I arrived here quite by chance," he says of the post at Waterloo. He was visiting a friend in town and a job offer to teach at the university and complete his PhD in dynamics and system theory "came about. I expected to stay for three years or so, and now it's been 33," he laughs.

Andrews speaks with conviction of the importance of cooperative education to give engineering students hands-on experience, something that Waterloo spearheaded in Canada. The program currently requires six, four-month work terms for graduation. Most graduates take jobs in the industrial sector, and Andrews is adamant that educational institutions need to keep up with industry trends like design software and artificial intelligence, and hire professors with industry experience. "We want to convey the idea to students that getting the theory right is important, but getting the job done right is even more important," he says. The "soft skills" like communication, team project management and work placement reports are all part of the on-site learning experience, he says–along with making informed, ethical decisions.

With such dedication to the profession, it's likely Gord Andrews will have a hard time leaving the university after his three-year appointment as an adjunct professor is through. Just in case, he's already planning retirement projects like relaxing at the family cottage on the Bruce Peninsula, sailing his Laser, and traveling with Isobelle. ◆

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