

## [ LETTERS ]

### ENGINEERS IN AVIATION

In over 25 years of membership I can probably count on the fingers of one hand the number of articles I have read in our journal that pertain to my field of engineering practice, namely civil aviation in Canada and, more specifically, the certification of aeronautical products. The most recent example is that of John Roberts, P.Eng., entitled "Erosion of professional engineering by the federal government" (*Engineering Dimensions*, July/August 2011, p. 56).

I have personal experience listening to senior managers in the federal department where I once worked say that what many of us were doing was not actually engineering. This statement was made about employees whose job descriptions, titles and classifications include the word "engineer" and for which the required qualifications include eligibility for registration as a licensed professional engineer. Functions include writing or reviewing analyses and test reports substantiating claims that a particular aspect of a design complies with the required technical standard. Such design standards are like any building code; compliance provides reasonable assurance of providing an acceptable level of safety to the occupants of the aircraft and to the public at large.

The title and content of the article rightly assigns much of the responsibility for this situation to the federal government, but provincial engineering licensing bodies must also accept some of the burden. The federal government is simply not held to account by the licensing bodies, in part because there is no national licensing standard.

In the same issue of *Engineering Dimensions*, PEO President David Adams, P.Eng., laments the low number of engineering graduates who go on to seek registration and licensure. Surely, it is obvious that in the absence of an employment requirement to be registered, the incentive for doing so is greatly diminished. The eventual consequence of this is the main subject of Mr. Roberts' article: that real engineering work with a direct bearing on public safety is increasingly being carried out by people who are not licensed engineers and who may not be working in a framework that provides suitable oversight and enforcement of appropriate standards of practice.

In my view, one way to begin to address the issues identified by Mr. Roberts and President Adams is to vigorously pursue the national licensing standards that were the subject of some hopeful discussions during Mr. Adams' previous tenure as PEO president. I urge all PEO members and our colleagues in other jurisdictions to support this initiative and give hundreds of engineers working in federally regulated industries a good reason to join our ranks and to fulfill our collective responsibilities to protect public safety.

Malcolm Imray, P.Eng., Ottawa, ON



### A STRONG FIGHT

I am deeply disturbed by John Roberts' article "Erosion of professional engineering by the federal government" (*Engineering Dimensions*, July/August 2011, p. 56). Both what the federal government proposes to do regarding air worthiness, and the arrogance behind the attitude, can be equally criticized. I encountered the latter 15 to 20 years ago, at which time my firm did contract design work for the Department of National Defence (DND). Examples were:

1. We had to negotiate our rates annually with Supply and Services Canada. Because the federal government did not require us to carry liability insurance, we were prohibited from including insurance premiums as a legitimate cost of doing business.
2. The technical authority that had approval authority for all our work was, for a period of about 10 years, a retired senior petty officer from the navy with a Grade 9 education.
3. Our design drawings, schematic, detail and assembly alike, had to be submitted as originals to DND, which retained title. They could, and in at least one case did, change them without notifying us.
4. We criticized the controls on a crane designed for shipboard use as being dangerous from a human engineering standpoint. It would have been possible to activate the wrong one of a pair of similar-looking and adjacent controls and lose the payload completely. Our objections had no effect. We thought of threatening to notify PEO if the situation was not rectified, but realized that threat would have been an emperor without clothes. Finally, and thankfully, DND personnel on the west coast did lose control and the payload overboard without injury, and thus convinced themselves before anything lethal occurred.

I think we are dealing with the same mindset here. And short of an effort to convince all the stakeholders, including every provincial engineering association, that it is in everyone's vital interest to make a concerted campaign to strongly influence the government to change its mind, I don't know what else to do. Since we would be dealing with a sovereign authority, I don't hold out much hope. I would think Engineers Canada would be the natural leaders for such a fight as this is at the federal level, and I have no illusions as to it not being stubbornly fought or long drawn out. But the backing of the provincial associations must be strong, continuous and unyielding for any chance of even small success.

Thank goodness, at 79 years of age, my flying days are pretty much over.

Robert Norminton, P.Eng., Niagara Falls, ON

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### BUILDING IN SAFETY

Re "Erosion of professional engineering by the federal government" (*Engineering Dimensions*, July/August 2011, p. 56), which talks extensively about the work underway at Transport Canada (TC) to introduce Safety Management Systems (SMS) into the area of aircraft certification, I would like to take this opportunity to provide further information on our internationally recognized leadership in incorporating SMS into civil aviation.

SMS has been embraced in many industries, most notably in the energy sector, as a means to address what Dr. James Reason has referred to as "the Organizational Accident," wherein multiple independent weaknesses line up to produce a significant failure. Aviation is a complex business with many interdependent elements, so the vast majority of aviation accidents today are the result of this sort of failure. The general areas of design, manufacturing, maintenance and operations are common to the aircraft, the aviation systems, the air navigation system, the airports and the training programs.

An effective SMS consistently identifies and corrects these weaknesses in a proactive manner before they can combine with hazardous results. Their success is dependent on a proactive safety culture existing consistently

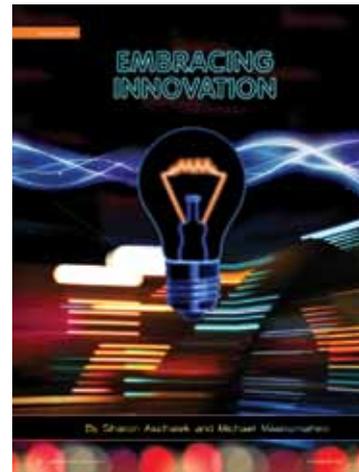
throughout the industry. Quality systems have evolved since the 1950s from quality control to quality assurance to quality management systems. The objective of the latter is to maintain and improve the probability that the product of any system will meet the appropriate specifications, standards and regulations. SMS embraces these principles while establishing specific safety criteria.

In the same way that quality management systems are geared to building in quality, SMS are focused on making safety inherent in aviation operations. The internal checks and balances established in an SMS enable certificate holders to meet the necessary regulations and standards with increased probability and confidence. The certificate holders continue to be responsible for meeting the regulations and standards, but with their own robust systems they have become less dependent on TC inspections.

The system of delegating ministerial authorization to industry delegates continues to be very effective in Canada. It would, however, benefit from the structure provided by an SMS to take it to an even higher level of effectiveness. The work still in progress to establish an operating certificate for design organization will fully integrate the aircraft certification business into the aviation system.

TC has been very clear in respecting the responsibility of provincial engineering associations for the practice of engineering while meeting its own responsibilities for the work done under delegated ministerial authority.

Our department continues to be open to discussing any concerns that Canadian engineering associations may have in relation to our initiatives to further improve Canada's strong aviation safety record. Martin J. Eley, P.Eng., director general, civil aviation, Transport Canada, Ottawa, ON



### INNOVATION AT MTO?

"Embracing Innovation" (*Engineering Dimensions*, July/August 2011, p. 44) made for very interesting reading. The Ontario Ministry of Transportation likes to claim, previously in these pages and the general press, that it is a world leader in innovation and design. We read in the article that perpetual pavement has been in use for decades elsewhere in the world—in some areas, I am sure, with similar environmental and volume conditions as southern Ontario. Yet the MTO is only now experimenting with perpetual pavement and claiming how innovative they are. If the article had not told us the location of the test strip, I would have assumed it to be in Mennonite territory to test it with horse drawn buggies in keeping with MTO attitudes.

I am reminded of an exchange of letters in this very magazine maybe 20 years ago. One engineer reader challenged the MTO engineer article writer, to which the MTO engineer replied, "I have 30 years' experience, I know best..." The other engineer replied, "No sir, you do not have 30 years of experience; you have one year of experience repeated 30 times." How true of our MTO.

David Moffat, P.Eng., Toronto, ON

## COMMENTS ON COUNCIL

As a concerned member of PEO and a seasoned volunteer, including many years as an active participant in the forum, I feel compelled to speak out and comment on the most ridiculous actions I've ever encountered with educated professionals.

I've had the opportunity to interact with people on council (elected and appointed), committee members and interested members of PEO, so I believe I have a good handle on what PEO is about or should be about. At times, my opinions have differed from those I have interacted with and I accept that not everyone will think as I do. That's what is great about living in a free society—we don't all have to believe in the same thing.

I am deeply disappointed in what is going on at PEO over the last year. I have watched and listened to people who I held in great esteem spew forth spitefulness and childishness. I have been admonished as being young and naive just because I held an opinion different than a group of "professionals" who were seeking seats on council. I haven't called these same individuals old and out of touch because their opinion was different than mine.

What is the role of council and a council member? Why do people keep harping on elected versus appointed council members? All councillors are equal—one vote each, no more, no less. Do not lose sight of this. Too much time at council is being spent fighting about who elects whom. The elected and appointed members are there to protect the public and only the public. Do not differentiate between who was elected and appointed. For members of council to continually



segregate council in this fashion is extremely disrespectful, unprofessional and prejudicial. Each councillor should be held to the same standard and afforded the same level of respect.

I am disgusted with the way council is behaving—no wonder people don't want to volunteer. Unless you agree with certain factions on council, you are branded as disrespectful and ill-informed. Are certain council members not held to the same standard as they hold others to? Respect is earned, ladies and gentlemen. There is no excuse for the disruptive actions of some councillors. The elitist attitude of some needs to be checked at the door.

I'm sure council members believe what they are doing is in the best interests of the profession—but it's not. Butting heads together is not doing any good. You need to get down to brass tacks and get to work to protect the public and not the self interests of members and certain council members. Enforcement of the act to protect the public is the only business councillors should be focusing on. Crunching numbers on how many elected officials voted on an issue versus how many appointed officials voted is a complete mockery of what you are there for.

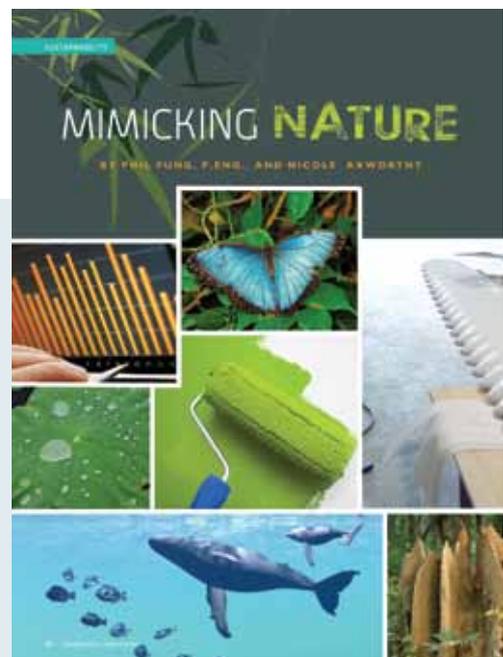
Chantal Chiddle, P.Eng., Kingston, ON

## IS BIGGER BETTER?

The July/August *Engineering Dimensions* "Letters to the editor" suggested we should mimic nature (p. 70). A recent article in the *National Post* stated that CP Rail had to increase the size of its trains to make more money. Nature does not put one large leaf on any of its plants, but has many smaller ones. The rail and trucking industries are constantly increasing the length and weight of their equipment.

I cannot understand why CP and CNR have to have three or four engines pulling over 150 freight cars. Why don't they divide those trains into smaller units? Accidents are very expensive.

M. Carl Kaufman, P.Eng., Waterloo, ON



## [ LETTERS ]

### REVISING EDUCATION

It was refreshing to read an excellent article by President Adams, P.Eng., in the July/August 2011 *Engineering Dimensions* ("A hand up for young graduates," p. 3). Mr. Adams outlines the root cause for the reduced job opportunities available in the current market for most graduating engineers. Mr. Adams rightly urges the need for the involvement of the Ontario Centre for Engineering and Public Policy (OCEPP).

The primary aim of a degree course should be to produce practical engineers who can take the ball and run within weeks of being hired. No wonder the employers are opting for graduates with five years' experience because the new graduates need a significant amount of on-the-job training. I have experienced this myself with several new graduates.

The degree courses from MIT (US), IIT (India) and from many universities address this deficiency by working in close collaboration with industry. This enables the students to have significant job experience by the time they graduate. Canadian universities should follow this lead by revising their degree course syllabus. The goal of a four-year degree course should be to produce engineers with a firm grasp not only of engineering principles but also of how to apply them to design, operation and problem solving of all engineered products. One other deficiency that needs to be emphasized is the need for improved communication skills (both written and oral). The computer age has been progressively eroding these skills starting from school level onwards to university.

A.N. Kumar, PhD, P.Eng., Georgetown, ON



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### FURTHER NOTES ON FORENSIC ENGINEERING

There has been much back and forth on this topic since it was featured in the January/February 2011 issue of *Engineering Dimensions*, involving confusion surrounding the terms "expert witness," "failure analysis" and "forensic engineering," and the functions and requirements of those engineers who may perform in these roles.

First, I refer to Sam Kodosi's letter in the May/June issue in which he reminds interviewee Doug Perovic of the multidisciplinary requirements of failure analysis, which is almost always involved in this work ("Crediting forensics work," p. 87).

The second is "This is my life," which I find very appropriate (July/August 2011, p. 68). Chemical engineering, like the associated materials design, is a neglected subject—except where corrosion is concerned, which is certainly the case in the process industries, which, as the writer points out, have been almost totally ignored in *Engineering Dimensions*.

Finally, we come to Frank N. Smith's letter in the July/August issue on "Use of terms" (p. 69), which again highlights the role of chemistry—once more, multidisciplinary.

Now remains the reply to Mr. Smith's comment on failure analysis versus forensic engineering.

There is a Canadian Society of Forensic Science and it includes, in a very minor capacity, a section for forensic engineers, about which I know nothing. In the US, it is a completely different matter. The National Academy of Forensic Engineers (NAFE) is a large and lusty body with rigorous requirements for membership. This, of course, lifts forensic engineering above failure analysis, even though ASM International does have a *Journal of Failure Analysis and Prevention*.

The American Society for Testing and Materials (ASTM International) is engaged in drawing up a standard for forensic engineering that has been put to ballot many times and is now close to publication. I am on the committee and the work is confidential, but it can be said to pay attention to NAFE's concerns.

What is more important in Ontario is the addition of CP53.03 to the Rules of Civil Procedure. They are quite simple and an echo of PEO's position—the expert may testify only in areas in which they have competence, but this has the force of law behind it. In each and every case, each expert must sign and return this document to the court prior to testifying.

The consequences of this could be very interesting as many prominent experts have no formal (and very little informal) training in corrosion and thus would not qualify as experts in many of the cases they are now handling. Few engineers I know are qualified to perform general failure analysis. I know more that lay claim to forensic engineering and, because of their shortcomings in the area of corrosion, are or will be limited in their range of practice.

The field of forensic engineering is emerging from the stigma of junk science and evolving into a recognized and regulated area of practice. We must at all costs avoid the catastrophic diminution of reputation that occurred in forensic pathology following the revelation of Dr. Charles Smith's egregious shortcomings.

John F. Clayton, P.Eng., FEC, Brampton, ON