

PROFESSIONAL ENGINEERING AND EGBC

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Coverage

1. Introduction
2. Professionalism & the Roles of Professional Engineers
3. Professional Engineering
4. EGBC
5. The Iron Ring



1. Introduction



Elliot Lake Mall Roof Collapse

Case study at the heart of describing an engineer's professional responsibilities! What are a few key words that are conveyed by the video clip?

- Human tragedy
- (Inadequate attention to) public safety
- Unprofessional conduct
- Emergency response also critical
- Continual improvement



Elliot Lake Mall Roof Collapse

- In June 2012, mall roof collapsed killing 2 people and injuring 19
- In July 2012, Ontario government established an independent public inquiry with Commissioner Belanger (– the inquiry cost some \$20 million)
- Final report was released in October 2014



Elliot Lake Mall Roof Collapse

- Inspecting engineer had earlier claimed building was “structurally sound”; at owner's request (to ease a refinancing application), he changed report after sign-off, removing photographs and references to "ongoing" leakage
- Commissioner stated that some of the engineers forgot the “moral and ethical foundation” of their vocation, and were more concerned with pandering to clients than protecting the public
- The report made 71 recommendations re. maintenance, inspections and emergency response capability
- The engineer's trial ran from September 2016 – June 2017: insufficient evidence to support criminal negligence beyond a reasonable doubt



2. Professionalism & the Roles of Engineers



What is Professionalism?

- Dictionaries state: *"The conduct, aims or qualities that characterize a professional person"; "set of **attitudes** and **behaviours** believed to be appropriate to a particular occupation"*
- The EGBC Code of Ethics states: *"Members and licensees shall act at all times with fairness, courtesy and good faith to their associates, employers, employees and clients, and with fidelity to the public needs. They shall uphold the values of truth, honesty and trustworthiness and safeguard human life and welfare and the environment."*



What is Professionalism?

As indicated, professionalism is comprised of **attitudes** and **behaviours**. Behaviours may relate to:

- Honesty, integrity, trustworthiness
- Respectfulness – courtesy, also deportment, punctuality, reliability, maintains confidentiality
- Fairness – fair treatment of all; good faith
- Specialized knowledge
- Knowing ones limitations
- Competence
- Continual improvement – lifelong learning
- Open-mindedness
- Excellence - exceeding expectations
- Efficiency and time management
- Accountability – responsible for ones actions
- Altruism (selfless concern for the well-being of others)
- ...



What is Professionalism?

- Some companies have adopted a *Code of Conduct* that may relate to these and/or additional aspects of professional behaviour
- These may relate, for example, to: competency; conflict of interest; perception of conflict of interest; confidentiality; use of company documentation; respect for privacy; environmental responsibility; cultural sensitivity; equity; discrimination; harassment; occupational health and safety; alcohol and drug use; ...



Roles & Responsibilities of Engineers

Generally:

- Demonstrating professionalism
- Adhering to the EGBC Code of Ethics

Specifically:

- Protection of the Public
- Serving the Public Interest

These usually refer to public safety, but may also relate to the economy and the environment



Roles & Responsibilities of Engineers

- **Protection of the Public**

- EGBC Code of Ethics states: "*Hold paramount the safety, health and welfare of the public, the protection of the environment and promote health and safety within the workplace*"
- Minimizing the risk of failure impacting public safety with respect to design, construction and operation of facilities
- Minimizing the negative impacts on public safety that arises from a failure



Roles & Responsibilities of Engineers

- **Serving the Public Interest***

- **EGBC** Code of Ethics: "*Hold paramount the ... welfare of the public ...*"; "*Members ... shall act at all times ... with fidelity to the public needs*"
- Reduction of negative societal, economic and environmental impacts, even when these imply reduced private profits

- *** Note. Public interest** – benefit to the general public (vs. "selfish" interest of an individual, group or company) – assessed by comparing net benefits and costs to the public of a decision, program or project



Roles & Responsibilities of Engineers

Other roles and responsibilities

- Professional engineers may take on other roles and responsibilities, not specifically identified in the Code of Ethics
- Examples include entrepreneurship, profit-making, volunteerism, ...
- However, these may still be impacted by the Code of Ethics and codes of conduct



Roles & Responsibilities of Engineers

Competing Stakeholders Interests

- A key dilemma arising in many civil engineering projects relates to competing stakeholder interests
- Examples include:
 - "NIMBY" (not in my back yard)
 - Economic development versus increased levels environmental protection
- The role of the engineer is often to provide informed options for the consideration of decision-makers, backed by a sound rationale

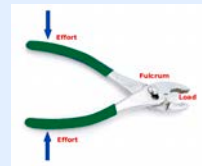
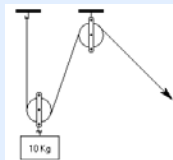


3. Professional Engineering



Pre-Engineering in Ancient Times

- Early building blocks



- Major early structures



- In Canada and BC, many activities of First Nations communities



Origins of Professional Engineering

- But professional engineering is more than building a structure; it also involves also acquiring and applying scientific, mathematical, economic, social, and practical knowledge in order to design, construct, ...
- Three additional ingredients were needed for engineering to develop fully as a profession:
 1. The Printing Press
 2. The Industrial Revolution
 3. Organization and Regulation



Origins of Professional Engineering 2

- 1. The Printing Press:** around 1400; major impact on the development and spread of knowledge, ideas, science
- 2. The Industrial Revolution:** 1750 – 1850; major advances in areas such as textiles, metallurgy, mining, chemicals, agricultural machinery, transportation – canals, roads, railways, ...
- 3. Organization and Regulation.** In the UK:
 - 1771: Society of Civil Engineers (social / technical)
 - 1818: Institution of Civil Engineers (all disciplines)
 - 1890's: introduction of exams for professional engineering qualifications



Origins of Professional Engineering in Canada

- Corresponding developments, a little later, in Canada
- Early focus on transportation (railways, roads) and resource development (mining, forestry)
- 1800's: explorers, the gold rush, mining, road and rail construction
- Organization and Regulation:
 - 1887: Canadian Society of Civil Engineers formed (all disciplines)
 - 1918: Name changed to Engineering Institute of Canada (EIC)
 - 1920's: provincial associations (PEO, APEGGA, EGBC, OIQ, ... or forerunners), along with provincial acts regulating engineering
 - 1970's: EIC's divisions spun off to technical societies ... CSCE, CSME, CGS, ...



Regulation of Engineering in Canada

Background

- The engineering profession is regulated by various jurisdictions worldwide to protect the safety, well-being and interest of the public
- Licensure provides the title "Professional Engineer" (P.Eng.) or equivalent, and grants the right to practice professional engineering
- The P.Eng. title can only be used by licensed engineers; it grants the authority to take legal responsibility for engineering work
- The practice of engineering is protected in law and enforced in all provinces



Regulation of Engineering in Canada

Origins in Canada

- 1920's: provincial associations formed (PEO, APEGGA, EGBC, OIQ, ... or forerunners), along with provincial acts regulating engineering

Origins in BC

- In 1920, Province passed the *Engineering Profession's Act*, associated with the founding of the *Association of Professional Engineers of BC*
- [N.B. Engineering education in BC started with UBC's founding in 1915]
- In 1990, geoscience was included, resulting in a name change and a revised act entitled the *Engineers and Geoscientists Act*



Regulation of Engineering in Canada

Role of EGBC

- Under provincial law, *Engineers & Geoscientists British Columbia (EGBC)* – regulates engineering practice in BC
- Specifically, EGBC is authorized under the Province's *Engineers and Geoscientists Act* to uphold and protect the public interest with respect to engineering – by licensing all individuals who practice professional engineering in BC and by regulating the engineering profession in BC
- EGBC also has some non-regulatory roles



Regulation of Engineering in Canada

The Concept of Self-Regulation

- **Self-regulation** refers to the regulation of a profession, in conformance with the relevant Act, by a body comprised of the members themselves
- In BC, the engineering profession is self-regulated through EGBC on the basis of powers provided to it through the *Engineers & Geoscientists Act*
- An alternative model is direct regulation by government through a government ministry, department or body
- Sometimes self-regulation may be curtailed or withdrawn, e.g.:
 - Teachers in BC
 - Engineers in Quebec
 - Recent reduction in degree of self-regulation of engineers in BC



Regulation of Engineering in Canada

National Roles

- EGBC and other provincial and territorial associations are constituent members of *Engineers Canada*
- *Engineers Canada* includes the *Canadian Engineering Accreditation Board (CEAB)* and the *Canadian Engineering Qualifications Board (CEQB)*; it is also engaged in advocacy and promotion and in the development of national policies, positions and guidelines
 - CEAB is responsible for accreditation of engineering programs across Canada
 - CEQB is responsible for developing national guidelines for professional engineering qualifications, standards of practice, ethics and professional conduct



Regulation of Engineering in Canada

Engineering Accreditation

- CEAB accredits engineering programs across Canada
- Graduates of accredited programs meet the academic requirements for the P.Eng.
- CEAB accredits by assessing conformance with criteria that relate to:
 - Graduate attributes (knowledge base, problem analysis, investigation, design, professionalism, ...)
 - Students (admissions, promotion, counseling, ...)
 - Curriculum content and quality (natural sciences, engineering design, laboratory experience, ...)
 - Program environment (faculty members, leadership, financial resources, ...)
 - ...



4. EGBC*

Note:

- EGBC is the acronym for *Engineers & Geoscientists BC*
- Legal name is *Association of Professional Engineers and Geoscientists of British Columbia*



Governance and Operation

- EGBC is governed by a Council
 - 13 elected members
 - 4 lay members appointed by Lieutenant Governor
 - Faculty and PGEO appointees if neither elected
 - Council includes the President, Vice-President and immediate Past-President, each with one-year terms
- A CEO and Registrar, reporting to the Council, is responsible for EGBC's operational activities
- The membership is engaged through branches, committees and other ways, and also votes in elections and on issues from time to time
- Key standing committees includes the registration, discipline and investigation committees



Regulatory Roles

- Regulation activities relate to:
 - Registration of suitably qualified individuals
 - Required standards of practice (through practice reviews, ...)
 - Investigation and discipline (re. members inappropriately engaged in the practice of engineering)
 - Enforcement (re. non-members inappropriately assuming the P.Eng. role or inappropriately engaged in the practice of engineering)
- EGBC also liaises on regulatory matters with *Engineers Canada* and with other non-engineering organizations – most notably as relating to foresters, architects and technologists



Other Roles

- Development of *Practice Guidelines* relating to specific engineering topics
- Promotion of *Organizational Quality Management* that supports quality assurance in companies as relating to engineering practice
- Advocacy and promotion of engineering with the public and governments
- Promoting careers in engineering, in part through student scholarships (via the EGBC Foundation)
- Branch activities and other forms of membership engagement and support
- Other member benefits such as through publications and through the "affinity" program



Ongoing Changes to Governance, Roles and Responsibilities

Triggered by the Mount Polley failure, the provincial government has undertaken a process to review and make changes to the governance, roles and responsibilities of EGBC and some other professional associations. Changes are expected to include:

- Appointment of the *Superintendent of Professional Governance*, to oversee EGBC and some other associations
- Councillors no longer freely nominated or elected
- Regulation of companies, not just individuals
- Mandatory CPD (continuing professional development)
- ...



Becoming a P.Eng.

P.Eng. designation on the following basis:

- Canadian citizen or permanent resident
- Academic qualifications – accredited program or completion of specified courses / exams
- Four years satisfactory engineering experience (one year in Canada)
- Law & Ethics seminar
- Professional Practice Exam (PPE) – 3-hour exam, including a one-hour essay
- English Language Competency – via PPE essay and referee comments
- Evidence of good character – via referee comments



En Route to the P.Eng. – the EIT

- Engineer-in-training (EIT) status is granted to individuals meeting the academic requirements of the P.Eng. and who are working towards the four-year work experience requirement
- Experience requirement is normally under the supervision of a P.Eng.
- EIT's participate fully in branch activities and enjoy several member benefits
- An EIT's demonstration of suitable four-year experience has shifted from a logbook approach to an on-line competency-based approach



Benefits of the P.Eng.

- Employment requirement of many positions with many employers
- Right to practice professional engineering
- Right to the P.Eng. title, and the use of stamp and seal
- Prestige, distinction and professional excellence
- Engagement in branches, professional committees, ...
- Access to EGBC publications, services, professional development, employment resources, affinity programs and mentoring



The Various Forms of Membership

P.Eng. and Engineer-in-Training are known. But also:

- Engineering Licensee – license to practice within a prescribed scope of practice
- P.Eng. with non-practicing status
- Non-Resident Licensee – licensed to practice in BC
- Inter-Association Mobility Agreement – applicant who is a P.Eng. or EIT in another province
- International Agreement – applicant with P.Eng. equivalent from a designated country
- Provisional Member – applicant working towards the one-year Canadian experience requirement



5. The Iron Ring



The Iron Ring

- In 1922, seven EIC past-presidents conceived of the “iron ring” ceremony; first ceremony in 1925
- Focused on “*The Ritual of the Calling of an Engineer*” developed by English poet Rudyard Kipling
- Distinct from EGBC and from PEng status
- Serves as a reminder of the obligations, ethics and humility associated with the engineering profession



The Iron Ring Ceremony

Isaacson's advice at past ceremonies has included:

- 1. Remember the big picture.** Apart from needed specifics, make sure that the overall direction is the right one.
- 2. Expect the unexpected.** Be prepared that something new or unaccounted for arises. We have developed systems of checks, reviews and quality control just to anticipate such situations.
- 3. Don't be a rubber-stamp.** Encourage diverse viewpoints, maintain independent thinking and ask the tough questions (Code of Ethics includes: "*accept, as well as give, honest and fair professional comment*")

