

# ***Advancing the Agenda on Canadian Engineering Accreditation*** **- Motions for Consideration by the Directors of Engineers Canada**

## **Overview**

These motions are offered to suggest a way forward from the recent Forum on Accreditation organized by Engineers Canada on August 17-18, 2016 in Toronto.

I believe we need to accomplish the following tasks, in the order presented, if we wish to capitalize on the work of the Forum participants and move forward with any enhancements to current CEAB accreditation criteria and processes.

### **1) Agree on the fundamental purpose of accrediting Canadian engineering programs by the CEAB**

As Kim Allen has noted, the Forum did not reach any conclusion on this, although various opinions were expressed by different stakeholder groups. In their report, the Forum facilitator's went so far as to suggest that there is some shift taking place in the engineering community's view of the purpose of accreditation. I believe this confusion must be put to rest before meaningful progress can be made on any other recommendations coming out of the Forum. My first motion, therefore, seeks to reaffirm and reinforce the fundamental purpose of accreditation.

### **2) Agree on how the acceptability of proposed changes will be determined, and by whom**

We need a clear definition of success for any substantive changes to CEAB accreditation criteria or processes. What criteria (objective function) will we use to evaluate them? How will we decide if they are worth implementing?

What should be the acceptance / approval process for proposed changes? Who will review them? Who will approve them?

### **3) Identify the low-hanging fruit, and task its implementation**

The Forum participants identified several potential improvements to the current CEAB accreditation processes that do not involve substantive changes to accreditation criteria and that could likely be implemented in the near term with minimal cost and disruption. We need to agree on what these changes are, and task someone with developing and implementing them. My third motion suggests that that someone be the Policy & Priorities Committee of the CEAB.

## **The Purpose of Accreditation**

The primary purpose of accreditation of Canadian engineering programs by the CEAB is to satisfy the regulators (Engineers Canada's owners) that the graduates of these accredited programs meet the regulators' academic requirements for P.Eng. licensure.

The regulators rely on the CEAB accreditation decisions as their grounds for deeming “AB grads” to meet [automatically] the academic requirement, and for not requiring them to pass further technical examinations in order to demonstrate that they possess the *knowledge* inherent in the academic requirement.

The so-called *academic requirement* for licensure is an amalgam of three more fundamental components:

(i) A ***knowledge*** requirement

The public is protected through licensure only when licensees are able to demonstrate that they have mastered the core body of scientific and technical knowledge underlying their intended scope(s) of practice. The usual means by which they demonstrate this knowledge is through passing examinations. It is important to note that Canadian engineering regulators, unlike their counterparts in some other jurisdictions, do not require graduates of CEAB-accredited programs to pass comprehensive technical examinations on the assumption that they have already done so in their academic programs – an assumption that has been verified by accreditation visiting teams.

The knowledge requirement has two dimensions: *breadth* and *depth*. Because the P.Eng. licence is an *unlimited* licence (i.e., the holder is free to change his/her scope(s) of practice without having to demonstrate mastery of the relevant subject matter), it is important that licensees have had a broad exposure to a broad range of physical and engineering science, so that they will recognize the boundaries of their knowledge and not stray unwittingly into areas of incompetence for lack of fundamental knowledge. In addition, because professional engineers are called upon to adapt technologies and apply basic science in novel situations, it is important that they have studied the subject matter at sufficient theoretical depth that they understand the basic scientific principles that will underlie their work.

(ii) A ***practice skill*** requirement

Given the large number and diversity of scopes of practice that fit within the definition of *the practice of professional engineering* in our Acts, it is unreasonable to expect students in accredited engineering programs to graduate with all of the specific skills necessary to practise in any specific scope of practice. Much domain-specific engineering practice skill typically remains to be acquired on the job after graduation, which is why Canadian engineering regulators (and indeed most professional regulators) have an experience requirement for licensure.

Students in accredited engineering programs are, however, expected to master the generic skills of engineering practice. These include the skills necessary to define and solve typical engineering problems, perform risk analyses, synthesize, design, and communicate findings and recommendations.

(iii) A ***formation process*** requirement

Finally, graduates of an accredited engineering program are expected to have undergone a rigorous formation process in which they have:

- been trained by those who have mastered specific engineering knowledge and skills;
- had opportunities to apply their newly-acquired knowledge and skills to real-world situations;
- been exposed to typical technologies and equipment they will encounter in work situations;
- been exposed to non-technical aspects of the application of science and technology in society;
- been exposed to issues of professional ethics they may encounter in practice.

The CEAB accreditation process requires visiting teams to assess the environment and culture in which engineering education takes place. In addition, they examine the work product of the students (assignments, design projects, etc.) to ensure that the above criteria not subject to knowledge examination are being met.

At the same time, they also ensure that all students graduating from a program have followed a “minimum path” to their degrees, and have passed examinations in required technical subjects. This work on the part of the accreditation visitors alleviates the need for the regulators’ admissions officials to examine in detail academic transcripts of graduates of CEAB-accredited programs.

Any change to CEAB accreditation criteria or processes that might undermine the regulators’ confidence that all graduates of CEAB-accredited programs automatically meet their academic requirement for licensure, and might cause them to examine the academic transcripts of such applicants and/or to assign them technical examinations, must be avoided if we hope to sustain our Canadian engineering accreditation system.

It is therefore important that the Engineers Canada Directors re-affirm that the over-arching purpose of accreditation is to support licensing decisions by Canada’s engineering regulators. While no one will dispute the desirability of maintaining the consistent high standard of Canadian engineering education, assisting engineering educators in their quality assurance efforts, and enabling their graduates to avoid having to repeat technical examinations in order to obtain licensure, these objectives are not the reasons the Canadian accreditation system was created, and are not sufficient to sustain it.

For this reason, any proposed changes to accreditation criteria and processes must enjoy the unqualified confidence of the Canadian engineering regulators.

### **Motion 1 – Affirming the Principal Objective of Accreditation**

*That the Engineers Canada Board affirm that the primary purpose of CEAB accreditation is to support the licensing activities of its owners, and that this purpose has precedence over any subordinate objectives or coincidental benefits.*

### **The Objective Function: Measuring Success**

It is important to have an agreed upon objective function against which any proposed changes to the present CEAB accreditation criteria and/or processes can be evaluated. Changes that

are satisfactory to the engineering regulators but that do not produce additional benefits in terms of other subordinate objectives likely cannot be justified.

Subordinate objectives of the Canadian engineering accreditation system could include:

- Minimize impact (in terms of effort, cost, and confusion) of the accreditation process on the higher education institution;
- Minimize impact (in terms of effort and cost) of the accreditation process on the CEAB and its visiting teams;
- Support flexibility and innovation in the delivery of academic programs;
- Maintain the integrity of Canadian engineering education.

It is also important to identify who (which stakeholder groups) needs to review and sign off on any substantive proposed changes to the accreditation criteria and/or processes before they can be implemented. These are:

(a) The Engineering Regulators

In my view, a best practice for Canadian engineering Regulators is to approve, on a periodic basis, by Council resolution, the accreditation criteria and decisions of the CEAB. This practice reminds all parties to accreditation that it is being done under the delegated authority, and at the behest, of the regulators. At the very least, any substantive changes to accreditation criteria or processes require formal acceptance of all the regulators. Such acceptance should be based on careful review by their licensing staff and boards of examiners, where such exist, and should indicate their continuing confidence in and reliance upon CEAB accreditation.

(b) The Institutions of Higher Education (HEIs)

Again, it would be desirable to have each institution with accredited programs indicate officially its acceptance of any proposal involving substantive change to the accreditation criteria or process. In this case, acceptance means the institution's continued willingness to seek accreditation of its programs and to comply with the requirements of the accreditation process. Some qualitative measure of the degree of improvement seen by the HEI in the proposed change(s) should be sought.

(c) The Canadian Engineering Accreditation Board (CEAB)

The CEAB would be expected to indicate its acceptance of any proposed changes on the basis of their implementability from the point of view of the accreditors.

(d) The Engineers Canada Board

The role of the Engineers Canada Board of Directors in approving proposed changes would be confined to ensuring that the process for establishing a successful proposal has been followed correctly, that appropriate peer review has been completed, and that a super majority of the above approvers have signed off. In other words, if the stakeholders are satisfied with a change, the EC Board should be satisfied

Note that there is no mention of engineering students or engineering employers (industry) in the above acceptance criteria. While these stakeholder groups are clearly beneficiaries of accreditation, they are involved neither in the accreditation processes nor in determining the acceptability of changes to it.

## **Motion 2 – Defining and Achieving Acceptance**

***That the Engineers Canada Board affirm the above acceptance criteria and roles for determining the acceptability of any proposed substantive changes to accreditation criteria and processes.***

## **Picking the Low-Hanging Fruit**

Forum participants identified a number of potential improvements to the existing accreditation process that could at least partially address some of the concerns expressed by representatives of HEIs.

The intent of this motion is to empower the CEAB to implement such improvements in the near term.

As noted in the Forum discussions, it is important that the Policy and Priorities Committee of the CEAB have direct input from regulators (admissions officials and representatives of boards of examiners) in their deliberations to ensure that any proposed changes will meet the needs of the regulators.

## **Motion 3 – Near-Term Improvements**

***That the Engineers Canada Board refer the report of the recent Forum on Accreditation to the CEAB and request the CEAB to implement appropriate non-substantive changes to its accreditation criteria and processes in areas such as the following to achieve the intentions indicated:***

- (a) Publish enhanced interpretive statements that indicate clearly how the existing accreditation criteria and credit system may be used to accommodate different innovative approaches to academic program delivery.**
- (b) Provide a mechanism for pre-visit consultation with CEAB staff and volunteer experts to permit HEIs to (i) determine the minimum workload possible to prepare for the accreditation visit, (ii) gauge the acceptability of innovative approaches to program delivery and determine how they can be accounted for under the existing criteria and credit system.**
- (c) Automate to the extent possible the collection of data necessary to support the accreditation visits.**

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26 September 2016