The path to becoming a PE

Do We Need the New Requirement?

The question at hand

Jay Harmon, P.E.

Professional Engineers (PEs) are licensed to protect public health and safety. Fundamental to this process, the National Council of Examiners for Engineering and Surveying (NCEES) established a model law that outlines the best practices for the licensure of professional engineers and surveyors. The NCEES model is used by state licensing boards as they develop laws and rules within their jurisdictions.

Currently, the NCEES model specifies that an aspiring PE must meet the following requirements: (1) obtain a bachelor's degree in engineering from an ABET-accredited program, (2) have at least four years of appropriate work experience, (3) achieve acceptable results on the Fundamentals of Engineering exam and the PE exam, and (4) possess a clean disciplinary record. But changes are looming on the horizon. A new model law has been developed that will take effect sometime after 2019 (the earliest implementation date would be January 1, 2020), and each state licensing board will need to decide if it will adopt the new version.

BS+30

The new model law increases the educational requirements for those who plan to take the PE exam. Specifically, in addition to a bachelor's degree, a master's degree or an equivalent 30 credit hours of graduate or upper-level undergraduate coursework in engineering, science, math, and/or professional practice topics will be required. At least 50 percent of these additional 30 credit hours must be in engineering courses. These additional credits cannot simply be continuing education credits; they must be taken at a university or through an agency, organization, professional society, or formal employer training program. NCEES and ASCE support the new model law, while ASME and other engineering societies have expressed opposition in a formal position statement.

The positions taken on the following pages, by Dan Thomas and Maynard Herron, lay out the cases for ASABE to support the new model law or oppose it. This debate is part of our effort to gather input from the membership on the official position that ASABE should take. To give us your input, please complete the survey at www.surveymonkey.com/s/ZZ77LRB. Or mail or email your comments to ASABE Executive Director Darrin Drollinger, 2950 Niles Road, St. Joseph, Mich., 49085, USA, or drollinger@asabe.org.

We'll let you know the survey results in a future issue of *Resource*, and we'll keep you posted as the discussion continues.

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We Need BS+30 to Produce Qualified Engineers

Dan Thomas, P.E.

I completed an agricultural engineering curriculum back in the late 1970s (yes, some of us are that old), when the expectation for graduates included a broad cross-section of exposure to different technical courses and potential career pathways. We really didn't have options within the curriculum. Every student took courses in water, mechanical systems, plant/soil sciences, processing, structures, etc., and we studied all the core engineering sciences, regardless of whether we later chose a career that might not need some of the fundamentals, like thermodynamics.

We also had a core group of courses that were designed to give us a breadth of exposure beyond our technical curriculum. These "general education" courses were not a large part of the engineering curriculum because we were primarily expected to achieve a degree of knowledge that would prepare us for an engineering career. We also got some limited exposure to the other sciences. In addition, we were expected to take the Engineer-in-Training exam (now the Fundamentals of Engineering exam). The opportunity to achieve a Professional Engineering license and a career that would involve significant design work was the ultimate goal, and I believe we acquired the core knowledge necessary to begin doing that.

The current pressures (funding, ranking, parents, legislatures, etc.) within many academic institutions are pushing a greater number of general education courses into every curriculum, while also pushing to maintain or reduce the total hours required to achieve a degree. With these pressures, some technical coursework that was required in the past has been sacrificed. In some cases, these sacrifices (especially if all curricula are pushed down to 120 total semester hours in a four-year engineering curriculum) could result in BS-level engineering graduates who have insufficient technical knowledge to start performing as engineers.

Within other professional curricula, such as architecture, this problem was recognized some years ago, and architecture curricula were modified nationwide to require five full years to be eligible to become an architect. In medicine, additional training and residency experience are necessary before newly minted doctors can practice medicine. Should engineering be relegated to any less rigor and perhaps fewer expectations when compared to other professions? What are the options to ensure that engineering graduates have attained sufficient core knowledge before they attempt the Fundamentals of Engineering exam?

One solution, proposed by the American Society of Civil Engineers as part of its "raise the bar" initiative (www.raisethebarforengineering.org/seeing-future-looking-back-0), has been adopted by the National Society of Professional Engineers. The idea is to require all engineering graduates, who expect to sit for the Principles and Practices of Engineering (PE) exam in the near future, to obtain a BS degree plus 30 hours of additional coursework or a BS degree and an MS degree (thesis or non-thesis). The goal is to ensure that all engineering graduates have mastered sufficient technical content to start an engineering career.

The positive benefits of the BS+30 initiative include: (1) sufficient technical coursework would be completed regardless of an institution's hourly requirement for the BS degree, (2) engineering as a profession would have more qualified individuals based on higher standards (similar to other professions, although such comparisons should not be the primary reason to make such a change), and (3) global competitiveness continues to require more qualified and better-educated engineers, and this initiative will help us meet that challenge. Regardless of ASABE's support of the BS+30 initiative right now, we must be diligent in maintaining our engineering curricula, to ensure the high standards of our profession.

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We Don't Need More Barriers to the PE

Maynard Herron, P.E.

A proposal has been made to change the prerequisites required to sit for the Professional Engineer license exam. As a licensed Professional Engineer practicing in industry, I feel a need to express an opinion on the subject. I do not think that the increased educational requirements will support either the objective of enhancing the public good or of ensuring ready availability of a qualified engineering workforce.

Several thoughts come to mind when I consider the long-term effects of such a policy change:

• In general, graduate engineering curricula are heavily focused on research rather than on applying engineering solutions to problems. As a result, the students in these graduate programs make minimal gains in their practical engineering judgment, which is crucial for making good engineering decisions.

• With the additional academic requirements, the elapsed time between completion of a BS degree and sitting for the PE exam will be increased, which will reduce the available years in which an individual might work as a practicing engineer.

• Licensure in disciplines with relatively low numbers, such as agricultural engineering, will steadily decrease, and eventually disappear, due to the reduction in eligible candidates below the level that NCEES requires to maintain a discipline's PE exam. These smaller disciplines will be left only with exams outside their field, such as mechanical, civil, or electrical engineering.

• In fact, the number of licensed Professional Engineers in all disciplines will decrease as a result of the additional education requirement. This will affect our ability to provide engineering services that are important to the general public, resulting in increased costs and project delays.

• Emigration of engineering talent will also be a factor. The graduate degree requirement can be projected to result in approximately one-half of all eligible PE exam candidates holding temporary visas. ASEE's 2011 *Profiles of Engineering and Engineering Technology Colleges* reports that more than 40 percent of current graduate engineering students hold temporary visas, while enrollment in undergraduate engineering curricula has included 7 to 9 percent temporary visas over the past few years (www.asee.org/papers-and-publications/publications/college-profiles).

• Finally, additional educational prerequisites for PE licensure will likely be a deterrent to high school students who are evaluating potential careers. This will result in fewer engineering graduates in coming years.

Without question, the value of the PE license could be enhanced, and the value to society as a whole could be bolstered, but only if the means to do so can be established. Merely increasing the incoming educational requirement is not an effective means of strengthening the value of a PE license. Rather than putting more restrictive requirements in place, which will likely exclude many well-qualified individuals, the profession should look for ways to enhance the experience of engineers who are still in training. Increasing the competency of prospective PE candidates is best accomplished with exposure to and involvement in engineering applications that solve real-world problems.

In my conversations with younger members of the engineering profession, they often say that what they need to know is not always what they were taught. This gap between engineering applications in industry and engineering academia seems to be widening, and there are very limited resources for guiding young engineers through the period between completing the FE exam and sitting for the PE exam. Their experience could be strengthened, and their engineering skills could be improved, by a combination of mentoring, a PE exam with more emphasis on applications, and increased efforts by the engineering societies, including ASABE, to develop application-based exam preparation materials within their respective disciplines.

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