STRUCTURAL ENGINEERING

From graduate school to workplace

by Dr. Oguzhan Bayrak, University of Texas at Austin

In this article, I will focus on the life of a structural engineering graduate student, as she or he transitions from graduate school to a structural design office. The thoughts I will share in this regard reflect my personal experience as well as the experience of some former students, friends, and colleagues. I will be the first one to admit that anecdotes and the thoughts of a few of us should not be taken as the universal truth. Nonetheless, they may prove to be helpful to some of our readers as they transition from being students to being gainfully employed junior engineers.

As we teach various aspects of structural engineering to the next generation of engineers, we are always mindful of the fact that structural engineering is an applied science. It is with that understanding that we spend a great deal of time explaining the underlying science and engineering to our students, while grounding our discussions with a myriad of applications.

We place great emphasis on the first principles and explain them to our students in painstaking detail. We talk about the fact that the design codes are living documents and that a variety of code provisions evolve and change in time as we continue to learn more. Learning in this regard comes from various research projects' findings, lessons learned from field experience, as well as the design experience as we continue to push the boundaries of our knowledge forward.

In our classes, we state and restate the fact that the first principles are here to stay as the design codes continue to evolve and improve. We indicate that we cannot negotiate statics, strength of materials, beam theory, and the like. In contrast, we acknowledge that the state of design practice can be advanced. For example, we can solve some field performance issues by better understanding how loads flow from their point of application to the foundations by using advanced analysis and design techniques. For instance, as I covered in some recent articles and will do so in future articles, the use of the strut-and-tie method in substructure design can lead to better-performing, longer-lasting bridges.

A typical structural engineering student, within the context described previously, finds a great deal of opportunities to take interest in structural mechanics, analysis, design, and the like as they go through school. All structural engineering students inevitably experience the great satisfaction derived from solving complicated problems by imposing simplifying engineering assumptions.

As a structural engineering student advances their maturity by taking a variety of classes, the mystery of "Why am I learning this?" and "Will I ever get to use this concept?" dissipates. All of a sudden the use of statics and structural analysis become second nature to a typical student. Yet the hunger to understand the "Why?" grows.

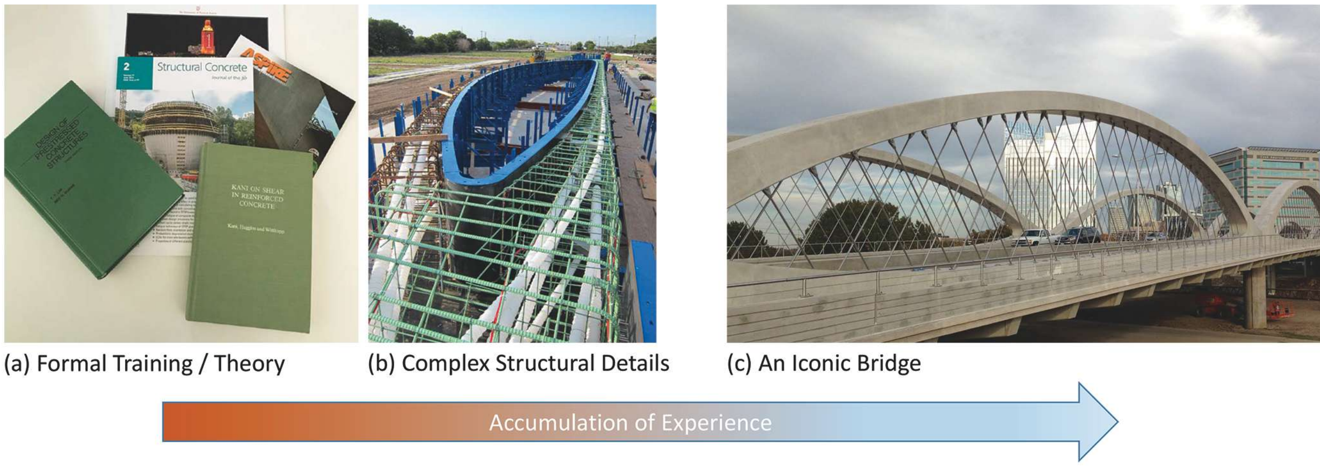
The more a student digs into the very important details of the profession in formal classes, the more they get convinced that there is so much more to learn. Frankly, this realization results in somewhat of an unsettled feeling, since all has not been fully understood, and at some point, the final bell rings. . .an administrative representative of a university shakes the student's hand and hands over the long-awaited degree. Now what? You guessed it correctly. Then comes the first job.

Each year, as I deliver some parting words to the students going through our program, I indicate that structural engineering is an "old person's profession." That is, in our profession, experience is extremely important; a student gets out of school with all the right tools in their toolbox, but they have not quite used them in the "real world." In doing so, the oversight provided by more senior engineers in their new job is extremely important. Mentoring provided by immediate supervisors is probably every bit as important as understanding the fundamentals while going through school.

That is, it is extremely important for a junior engineer to see that his or her calculations, drawings, or designs are being reviewed by a senior engineer and that a senior engineer can spot errors or verify the correctness of calculations on the back of an envelope, expediently. The first time a junior engineer sees that his or her work can be verified so quickly will serve as an invaluable educational experience. . .the appreciation for experience will rapidly grow in the eyes of a junior engineer.

So, what is a junior engineer supposed to do as they get ready to leave school and take their first job? First, they must be cognizant of the fact that we have all been there. We all had to transition from a classroom setting to the design office environment. We all had successes and we all made mistakes and learned from all of those. In my view, making mistakes is quite OK. Not learning from them is not OK, because that would be a missed opportunity.

Each junior engineer needs a mentor, a more senior colleague, to look over their shoulder to make sure that all is going well. All employers I know recognize this fact and provide the necessary mentoring, guidance, and oversight to their new employees.

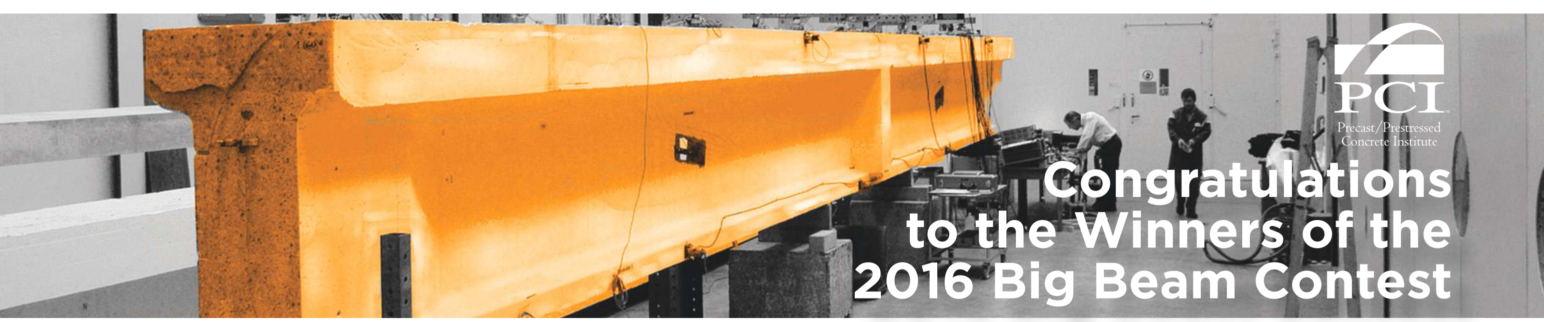


Transition from formal education to practice. Figure: Hossein Yousefpour.

Next, the faster a junior engineer realizes the fact that structural engineering is all about details, the better off they will be. The devil is always in the details. We have all seen great-performing structural details as well as details that have caused significant problems in our careers. The importance of attention paid to details cannot be overemphasized.

Finally, a junior engineer must understand that they embarked on a profession that is committed to lifelong learning. The learning aspect of an engineer's life cannot and should not stop. They will have to learn from personal experiences as well as others' experiences.

Frankly, it is the learning aspect of the profession that a great majority of us enjoy the most. Staying engaged in professional organizations, serving on technical committees, and reading articles in technical journals and magazines like *ASPIRE*™ all help us further our education.



PCI Big Beam Contest 2016 Winners

All entries were ranked by total number of points earned per the contest rules. The first place team, for the second year in a row, was from the University of Notre Dame in South Bend, Ind.

First place: University of Notre Dame; Notre Dame, Ind. (Zone 4)
Faculty advisor: Yahya Kurama, PhD, PE
PCI producer: StresCore, Inc.; South Bend, Ind. (John Reihl)
Student team: Megan McKeon, Luis Gabriel Muñoz Dispa, Tyler Thompson, Thomas Sweeney, Anna Spatz, Molly O'Toole, Ryan Shea

Best Report
University of Alabama [Team Jelly Beam]; Tuscaloosa, Ala. (Zone 6)
Faculty advisor: Sriram Aaleti, PhD, P.Eng.
PCI producer: Gate Precast; Monroeville, Ala. (Mark Ledkins)
Student team: Vidya Sagar Ronanki, Saeid Hayati, David Burkhalter, Md. Kobir Hossain

Best Video
Iowa State University [Team 1]; Ames, Iowa (Zone 3)
Faculty advisor: Sri Sritharan, PhD
PCI producer: Forterra Pipe and Precast; West Des Moines, Iowa (Jeff Butler)
Student team: Michael Rosenthal, Nathan Scharenbrock, Anmol Pakhale

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