

# Engaging Industry to Enhance Student Learning

by Dr. Brandon Ross, Clemson University

I'm coming up on my tenth anniversary at Clemson University. It has been a decade filled with many outstanding students whose curiosity and eagerness have kept me motivated and given me confidence in the future of our industry. Over the years, I've observed that my students are highly motivated to connect classroom learning with real-world projects and examples. For this reason, I'm deliberate about bringing the real world into every class that I teach, particularly by engaging industry professionals. This is especially relevant for my Prestressed Concrete Design and Highway Bridge Design classes. At this milestone in my career, I want to share some successful strategies for engaging the industry to enhance student learning.

- **Field trips and plant visits.** Industry partners have hosted my students at construction sites, in-service bridges, and precast concrete plants (Fig. 1). It is amazing to watch my students light up when they see that concrete and

reinforcing bars aren't just abstract concepts which I tell them about in class! There is no substitute for in-person observation.

- **Professional writing samples.** Students often tell me that they decided to pursue engineering because they like math and science but not writing. Whenever I hear this, I promptly counter by telling the students that written communication is essential to engineering practice. To introduce students to professional writing, I give them examples of site-visit reports and request-for-information (RFI) memos. The samples are provided by practicing engineers, with any sensitive information redacted. I assign the students to write reports and RFIs using the sample documents for guidance. These assignments pair nicely with field trips.
- **Structural connection details.** University curricula tend to focus

primarily on component design and less on how components come together to transfer forces and moments. Recognizing this gap, I created a slide template for a "connection of the day" (Fig. 2) and invited practicing engineers to use the template to describe structural connections. Some connections are unique and complex; others are common and simple. Each week in class, I share one or two connections. I aim to introduce students to different types of connections and highlight the importance of detailing in structural engineering.

- **Reverse interviews.** Typically, industry employers interview students who are seeking employment. I reversed these roles and gave my students an assignment to interview practicing engineers. The students asked about the day-to-day work of an engineer and the importance of professional licensure.

Figure 1. Dr. Ross and students visiting an apartment complex construction site. Through field trips and plant visits, students connect classroom learning with real-world examples. Photo: Clemson University.



## Connection of the Day

Clemson University  
Structural Engineering

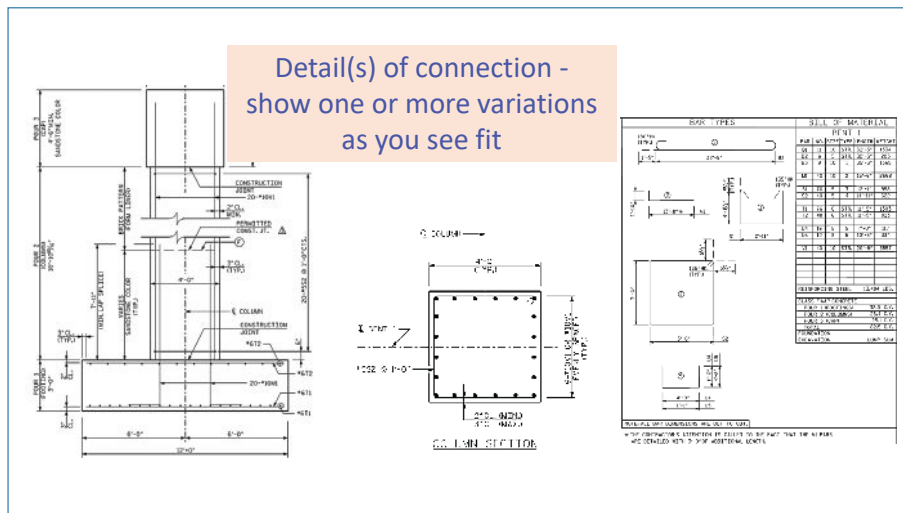
Courtesy of:

Your company  
logo /  
information



Picture(s) of connection

Title of connection. For example,  
“Concrete pile to concrete footing”



Detail(s) of connection -  
show one or more variations  
as you see fit

Figure 2. To introduce students to different types of connections and the importance of detailing in structural engineering, Dr. Ross has created a slide template for a “Connection of the Day.” Practicing engineers are invited to use the template to describe a structural connection to students. Figure: Dr. Brandon Ross and the North Carolina Department of Transportation.

The interviews were conducted via web conferences, which helped with logistics and allowed students to interview engineers from all over the country.

- **Equipment and supplies.** Clemson alumni and stakeholders are generous, and this generosity directly affects student learning. The hands-on experiments I have conducted with students were possible because the materials and supplies for the specimens were donated. Similarly, the Built Environment Laboratory at Clemson, where many student projects are performed, contains donated equipment and supplies.
- **Guest lectures.** Once or twice each semester, I have a practicing engineer visit my class and give a guest lecture. With some coordination, the lecture topic can be aligned with the course curriculum. Students like to hear from someone besides me, and

I like having a rest! As an alternative to in-class lectures, practicing engineers also give presentations to the Clemson student chapter of the American Society of Civil Engineers. Guest speakers who provide free pizza tend to get the largest audiences.

- **Industry teaching assistants.** This past spring semester, a local engineer, who is a Clemson alumna, helped me as an industry teaching assistant. She joined each class period via web conference. It was nice having the perspective of a practicing engineer, especially when answering students’ practical questions. I plan to scale up the concept this semester by inviting practicing engineers to mentor students as they work on class projects.
- **Internships.** The marketplace for new engineers is red hot! Most of

my students are choosing between multiple job offers. When companies contact me about recruiting Clemson students, I encourage them to start by offering internships. Internships are a means for companies to engage students early and get a jump on their competitors. Internships also allow students and companies to take a “test drive” before offering or accepting full-time employment. These benefits of internships will remain even if the market for new engineers cools off.

I invite university faculty to contact members of the concrete bridge industry and get them involved with students. Likewise, I invite members of the concrete bridge industry to contact university faculty and find ways to engage with students. Every semester brings new students and new opportunities. I’m excited about the next 10 years of my career! 🚀