Building from tragedy

Kat Freidrich

Pinar Okumus brings her enthusiasm for civil engineering to her work as an associate professor at the University at Buffalo, encouraging a large group of students to excel in the field. She has published many papers on structures, analysis, and design with her students.

She says she decided to study civil engineering because she appreciated historical structures, loved math and science, knew civil engineers helped society, and saw a severe earthquake happen in Turkey.

"I knew that civil engineers do important work because Turkey is a very highly seismic region. When I was in high school, we had a terrible earthquake and it was a tragedy that affected my generation," she says.

Okumus attended Middle East Technical University in Ankara, Turkey. "I had wonderful professors," she says. "When I took my first statics class ... that professor, I don't know if it was just his personality or the way he taught the class. I knew from that day that I wanted to go into structures."

During her senior year, she says, a professor who worked on prestressed concrete, Erhan Karaesmen, recommended that she go to the United States to obtain graduate degrees. She was accepted by the University of Wisconsin–Madison.

"I had no idea what prestressed concrete was," Okumus says. "I went to the library and checked out books on [it]. I remember ... thinking, 'Oh, my God! That makes perfect sense! Prestressed concrete! Why didn't we think about this before?'"

At UW-Madison, Okumus met many international students and collaborated with them, she says. She decided to get a doctoral degree focusing on prestressed concrete bridges. She says that Madison was a beautiful city that won her heart, which motivated her to stay there for the rest of her graduate work. She decided not to accept offers of industrial employment and to go into academic research instead. "One reason I love prestressed concrete is because it allows us to build structures fast, but I also work on structures that can be repaired rapidly," Okumus says.

"These days, most of my time goes into looking into earthquake resiliency," she says. She studies structures that are protected from severe earthquake damage, examining how to bring buildings and bridges back into service rapidly after these natural disasters. "Life safety is always number one, but we also don't want to have large economic losses or even long downtimes for structures."

"Right now, I'm the lead investigator for a project where we're looking at earthquake resiliency of communities under the risk of coastal flooding, earthquake and corrosion hazards," Okumus says. "That project is a culmination of many years of work for me. [After] all of these years of work working on serviceability, durability, earthquake engineering, now I'm at a point where I can see the forest and bring people together from multiple fields and lead a project like this. When I look back, I see my work on structural systems that allow recovery from earthquake hazards, durability and modeling of bridges, and retrofit of buildings paving the way to that project."

She is also studying three-dimensional printing of fiber-reinforced concrete shells that can protect prestressed concrete girders from end-zone cracking. Her team is leveraging artificial intelligence and machine learning to evaluate existing concrete structures.

One challenge she encountered was that she had to reinvent her professional focus because the National Science Foundation stopped funding research on bridges for a while, she says. This resulted in her initiating projects on building engineering. The NSF later resumed funding for bridges, so she was able to return to the subject that ignited her curiosity since her PhD.

She says she enjoys work that involves physical labor. If she is doing instrumentation at a precasting plant or at a bridge site, this work sometimes starts before sunrise. She also works with her students to build structures in the laboratory for testing. "I take pride in [that] I do fundamental work, but I also do applied work. Very few people do both," Okumus says. "It is a challenge to go between the two worlds. In the fundamental research world, I get to work with academics, and in the applied world, I work with departments of transportation, designers, builders, and practitioners."

She is also proud of working with all of the students she has encouraged to enter the civil engineering field, she says. Okumus says she was encouraged to join PCI by her graduate advisor, who told her about a convention in the 2000s. "Ever since then, I've been involved. I've been part of different committees, including the Journal Editorial Advisory Committee. I'm a member of the Technical Activities Council, Innovation Committee, the Bridges Committee. I enjoy working with all of the people."

Participating in PCI has given her the opportunity to meet some of her closest friends in academia, as well as her co-investigators, she says. She received the George Nasser Award in 2013 for a paper on her doctoral research.