Improving bridge health condition data

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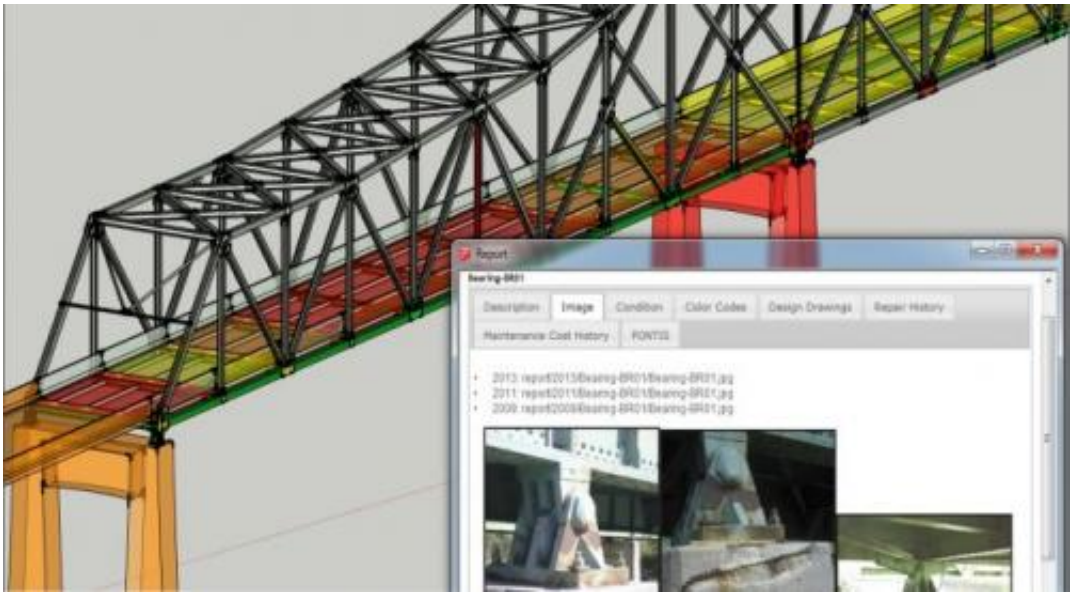

Data visualization of Visiting Associate Professor Zhigang Shen's research.

On August 1, 2007, when a section of an eight-lane bridge on Interstate 35W in downtown Minneapolis plummeted into the Mississippi River, killing more than a dozen people, Visiting Associate Professor Zhigang Shen—like many hearing the news—was appalled: he had been driving on the bridge himself just one week earlier. Unlike most people, however, Shen was in a position to actually address a significant part of the problems that had led to the horrifying collapse: how to improve the tracking and management of bridge health condition data.

With a master's degree in computer science and a Ph.D. in construction

management, he set about developing a software program that would allow transportation officials to view a 3D model of a structure over time—tracking its deterioration, required repairs, and maintenance costs in minute detail. The exceedingly precise models that can now be created using the program are color-coded, with areas requiring immediate attention in red.

"An enormous amount of data was being generated by bridge inspectors over the years, especially for complex steel bridges," he explained. "But you can imagine how difficult is to track conditions on small, individual, structurally critical pieces of each bridge. Even if reports are in the form of electronic PDFs, it's a daunting task."

Shen's program has been tested in Nebraska, where he holds a professorship at the University of Nebraska's School of Architectural Engineering and Construction, in Lincoln, and soon he expects to approach federal authorities about deploying it nationwide.

The author of more than 40 peer-reviewed articles in journals and conference proceedings and the recipient of several research grants from such organizations as the National Science Foundation and the Environmental Protection Agency, Shen also has a deep interest in practical and sustainable building design and construction. "People sometimes base their designs on unevaluated descriptive factors—if something appears 'green' they assume it must be," he explains. "But scientific-based quantitative evaluations can give designers and contractors better assistance with creating or retrofitting sustainable buildings and infrastructure. If you are designing an attic, for example, you can identify best ventilation ratios for energy savings under different climate zones and use computer modeling to determine how best to build or retrofit it."

Shen was drawn to the School of Engineering, in large part, by the

chance to work with Professor Bud Griffis, who chairs the Center for Construction Management Innovation and the NYS Resilience Institute for Storms and Emergencies, and by the many opportunities for collaboration that being at NYU presents. "To give just one example, big data has important applications in my work, and there are great things going on here in that field," he says. "I expect my time in the Department of Civil and Urban Engineering to be exciting and very rewarding."

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