

# New design means cheaper, more sustainable construction

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Dr. Sami Rizkalla explains that by testing the new concrete beam design to see how much weight it can bear, researchers have determined that it can handle two to three times the maximum weight it would be expected to bear. Credit: David Hunt

People are always looking for ways to make something less expensive and more environmentally friendly - and a team of researchers from North Carolina State University has figured out how to do both of those things at once when raising the large-scale buildings, such as parking garages, of the future.

More specifically, the researchers have figured out a way to use 30 percent less reinforcing steel in the manufacture of the concrete beams, or spandrels, used in the construction of parking garages - without sacrificing safety. Dr. Sami Rizkalla, one of the leaders of the research team, says they developed design guidelines that use less steel while maintaining safety and reliability. The new spandrel design "simplifies construction for precast concrete producers," Rizkalla says. In addition to using less steel, the new design cuts labor and manufacturing time in half - significantly decreasing costs.

Greg Lucier, a doctoral student at NC State who was also crucial to the research effort, says the new design guidelines include a significant margin for safety. For example, Lucier says the spandrels could handle two to three times the maximum weight they would be expected to bear. Lucier is also the lab manager of the Constructed Facilities Laboratory at NC State, which oversaw the testing of the new spandrel design.

The new design guidelines stem from a two-year project that was launched in January 2007, with support from the Precast/Prestressed Concrete Institute (PCI). PCI provided NC State with more than \$400,000 in funding, materials and technical support over the life of the project.

The success of the project is already drawing interest from the concrete industry, with individual companies coming to NC State to get input on how to improve their products and manufacturing processes. For example, Rizkalla says, many companies want to collaborate with researchers at the Constructed Facilities Laboratory on research and development projects related to new materials, such as advanced composites, to be used in concrete products.

While researchers have published some elements of the research project, they will present an overview of the entire project - including new

testing data - for the first time at the spring convention of the American Concrete Institute in San Antonio this month.

Source: North Carolina State University

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