IN MEMORIAM

Bridge Engineering Expert Dennis Mertz Dies at 63

Dennis Mertz, PhD, professor of civil engineering and director of the Center for Innovative Bridge Engineering at the University of Delaware (UDel), passed away last month after a prolonged battle with cancer. He was 63.

A professor at UDel for 25 years, Mertz dedicated a large portion of his professional career to advancing the state of the art in bridge engineering. The research he conducted, combined with his efforts on numerous technical committees, helped shape the industry into what it is today. His contributions were recognized earlier this year at the International Bridge Conference, where he was presented with the John A. Roebling Medal for his lifetime achievements in bridge engineering. He previously earned a Steel Bridge Forum Award in 1997, an Innovation in Steel Bridge Award from AISI in 1998, a Special Achievement Award from AISC in 2000, the Richard R. Torrens Award from ASCE in 2003 and the Richard S. Fountain Bridge Task Force Award from AISI and AASHTO in 2005. Mertz touched the lives of hundreds of students and directly shaped the career of many bridge engineers practicing today. He also mentored many young professors throughout the U.S., providing them with sound advice and guidance as they moved forward in their own academic careers.

"Dennis was a well-regarded leader and noteworthy contributor amongst his colleagues," said Bill McEleney, NSBA's managing director. "In addition to his superlative technical skills, his quick wit, upbeat personality and genuine friendship drew many to him. He was a great friend to many of us, and he will truly be missed."

Mertz is survived by his wife, Madelyn, and one brother.

SUSTAINABILITY

Steel Industry Unites for Material Transparency

SMDI has compiled a comprehensive list of industry-wide environmental product declarations (EPDs) for steel building products. These EPDs summarize the results of a life-cycle assessment (LCA) for specific steel products in the construction industry to describe their potential environmental impacts.

Construction professionals interested in viewing and using EPDs and other transparency resources in their building projects can visit **www.buildusingsteel.org** for the list of steel product EPDs and updates on other sustainability resources. Currently, the site includes EPDs for 11 product categories, including Fabricated Hot-Rolled Structural Sections and Fabricated Steel Plate from AISC (which are available for free at **www.aisc.org/epd**).

"Similar to a nutrition label on food packaging, environmental product declarations present concise information to help building professionals make better-informed product decisions," said Mark Thimons, vice president of sustainability for SMDI. "In an effort to be as transparent as possible, these steel industry EPDs are more comprehensive than those for many other building materials, creating a truly all-encompassing view of each product's environmental impacts."

Building professionals can use this list of EPDs to help earn credits in green building rating systems such as the U.S. Green Building Council's LEED v4, which offers opportunities for steel in a revamped materials section including credits for LCAs, EPDs and transparency.

SMDI will update its list as the steel industry continues to develop EPDs to maintain an informative, current resource for building professionals interested in the sustainability of steel building products.

People and Firms

- **Independence Tube Corporation** has entered into an agreement to sell the company to **Nucor Steel**. Founded in 1972 in a 53,000-sq.-ft facility on the southwest side of Chicago, Independence Tube has grown to 1.7 million sq. ft under-roof with two manufacturing divisions in Illinois and two more in Alabama. Nucor plans to install a electric-resistance-weld mill in the south, which will be capable of producing large HSS and pipe piling sizes.

- **Jaime Garza, SE**, has joined **John A. Martin and Associates, Inc., Structural** Engineers as senior project manager. Garza brings over 13 years of expertise in seismic design and retrofit of existing buildings, and his past clients include the University of California, the Los Angeles Unified School District, the Los Angeles Police Department, Los Angeles International Airport and most recently the Waldorf Astoria Hotel and Beverly Hilton Garden in Beverly Hills. To see a nonbuilding steel structure that Garza designed, check out the January 2015 Structurally Sound item "Vital Fluid" in the Archives section of **www.modernsteel.com**.

AISC NEWS

Larry Kruth Named AISC Vice President of Engineering

Lawrence F. Kruth, PE, has been named the new vice president of engineering and research at AISC, where he will oversee all technical activities. He succeeds Charles J. Carter, SE, PE, PhD, who has been promoted to president of AISC, effective December 5.

Most of Kruth's career has been with Douglas Steel Fabricating in Lansing, Mich., most recently as a vice president. He has notable expertise in fabrication and erection, quality systems, safety and connection design. Before joining Douglas Steel in 1984, Kruth had stints with H & G Fabrication Corp. in Grand Ledge, Mich., Kaiser Engineers of Pennsylvania in Pittsburgh, Master Engineers in Pittsburgh and Franklin Associates in Somerset, Penn.

"Larry brings an amazing breadth of expertise and proficiency in fabrication and erection and the associated engineering," said Carter. "I've worked with him closely on a number of AISC technical committees and have always been impressed by his knowledge and his ability to work with a wide range of people." Kruth has served on the AISC Specification Committee and its task committees on connection design and quality control and assurance, the AISC Safety Committee and the AISC Research Committee. He also has assisted with AISC'S efforts to provide resources for construction management education, is a 25-year veteran of the National Student Steel Bridge Competition, and served four years on the AISC Board of Directors.

Outside of AISC, Kruth is a member of the Research Council on Structural Connections, Structural Engineers Association of Michigan, MIOSHA Part 26 – Steel Erection Advisory Committee and MIOSHA Part 10 – Lifting and Digging Equipment Advisory Committee. He also has served as adjunct faculty at Michigan State University for the Capstone Structural Engineering class. In 2011, he was named Engineer of the Year by the Structural Engineers Association of Michigan.

NSSBC

2017 NSSBC Rules Posted

The rules for the 2017 ASCE/AISC National Student Steel Bridge Competition (NSSBC) are now posted at **www.aisc.org/steelbridge**. Oregon State University is set to host the national championship event May 26-27 in Corvallis, Ore.

This annual collegiate competition is an exciting visual display of engineering students' structural design and analysis skills at work. Throughout the academic year, student teams from across North America devote countless hours to designing, fabricating and constructing one-tenth-scale steel bridges. During competition, teams are challenged to assemble their bridge in the shortest time and under building constraints that reflect real-life structural specifications and construction regulations.

To reach the national event, each team must place among the top schools in one of 18 regional competitions held around the country in the spring. Bridge rankings are based on the categories of display, construction speed, stiffness, lightness, construction economy and structural efficiency.

See highlights from this year's NSSBC in the August article "Proven in Provo" (available at **www.modernsteel.com**).

letters

Investing Intelligently in Infrastructure

The quote "There seems to be one point on which everyone is in agreement: the need for increased infrastructure funding" from Scott Melnick's September editor's note (available at **www.modernsteel.com**) is correct, but it requires an important clarification. While sufficient funding is a main issue, it is not the only problem. The highest priority is fixing substandard bridges. The deterioration of our bridges is the most dangerous issue related to infrastructure. A failure of or even serious damage to a bridge may cost lives and will close a highway for a long period of time.

According to the U.S. Department of Transportation, at the end of 2015 there were 661,845 highway bridges in the country. More than 142,900 of these bridges are "substandard" (structurally deficient or functionally obsolete) bridges; this constitutes 27% of all bridges (based on the percentage of deck areas). In several states, the substandard percentage is over 50%! This is an alarming, unacceptable situation. A well-developed and maintained transportation system is vital to the safety of the traveling public as well as the economy. Yet the current yearly improvement is less than 0.4%. Assuming that the deterioration rate for bridges does not increase, at the current pace of improvement we will need 66 years to replace or retrofit all of the substandard bridges in the country!

It is important that we invest in our infrastructure that we need, but what may be even more important is how wisely we use the limited funding in order to fix or replace more substandard bridges for a shorter time. Unfortunately, many of our newest bridges are far from efficient structures. One example is the recent replacement of the east span for the San Francisco-Oakland Bay Bridge. This massive structure took 14 years to build at the cost of $6.5 billion. The cost was $33,330 per square meter, when for bridges with similar spans, the average unit cost is about $3,500 per square meter! This means that if Caltrans has used more efficient systems, they could have replaced nine times more bridge area.

Historically, engineers have played an important role in designing and building the country's highly developed network of railroads, highways and bridges that permitted the U.S. to become the leader in the world economy. And now engineers should once again take the lead in selecting, designing and building highly efficient structures in order to improve the poor condition of our bridges. Such an approach will demand significant revisions of the established methods of planning, designing and managing the process. But there is no other option if we want to solve the deterioration of our bridge infrastructure in a reasonable timeframe.

The transportation authorities should introduce a system that will motivate the various departments of transportation and all their personnel to strive for more efficient and economical bridges; similar motivation should be introduced for the general contractors awarded the projects construction. A good approach would be to have all bridge projects larger than a specific amount—say, $30 million—to be awarded based on competition.

The use of inefficient new structures is an enormous problem, and the first step towards resolving it is to recognize that such a problem exists—and then deal with it. The current poor condition of our bridges is not acceptable for the high standards of American bridge engineering. American engineers should not accept being left out of the development process for new, more efficient structures. With the necessary efforts and persistence, our engineers would be able to revive the golden age of American bridge engineering that produced the Brooklyn Bridge, the George Washington Bridge, the Golden Gate Bridge, the original 1936 San Francisco-Oakland Bay Bridge and the Verrazano Narrows Bridge.

—Roumen V. Mladjov, SE, PE

An Approachable Approach to Bolts

I was struck by James LaBelle's September article on anchor rods, "Strength and Engagement" (available at **www.modernsteel.com**). I found it very interesting, not only because of the topic but also because it was important and written in a simple and engaging manner. Much of the technical information we read today is academic and complicated. It is highly unusual to read about the strength of bolt threads in steel construction, yet it is certainly topical and the article was certainly approachable. In my undergraduate years in the early 1950s, for some reason we studied a number of the different thread designs used around the world and how stress raisers were handled by the geometry chosen. So it is of interest to follow later studies using sophisticated methods like photoelasticity, which were not available at the time.

—Lambert Tall, PE, PhD
Tucson, Arizona

SCHOLARSHIPS

Annual AISC Scholarship Winners Announced

This year, AISC has administered a total of $177,000 in financial aid to 54 deserving undergraduate and masters-level students for the 2016-17 academic year.

AISC's David B. Ratterman Fast Start Scholarship program for freshman and sophomore students, now in its fifth year, awarded 14 scholarships to students at two-year and four-year colleges. These students, who are relatives of AISC member company employees, are full-time freshmen or sophomores during the current 2016-17 academic year.

The AISC Education Foundation, in conjunction with several other structural steel industry associations, awarded 45 scholarships totaling $137,000 to sophomore, junior, senior and masters-level students for the 2016-17 academic year. We would like to offer our sincere thanks to these organizations for their generous continued support of our student programs.

Congratulations to the following students for earning their well-deserved scholarships for the current school year:

David B. Ratterman Fast Start Scholarships

$1,000 Award Recipients

- Carli Beveridge, University of Connecticut
- Breeanna Cash, Kansas City Kansas Community College
- Makaylah Howard, Mount Wachusett Community College

$2,000 Award Recipients

- Kaitlyn DeVos, Lake Area Technical Institute
- Carter Riechmann, Indian Hills Community College
- Shelby Snider, Lansing Community College
- Sean Templeton, Missouri State Technical College
- Sarah Unger *(not pictured)*, Blue Ridge Community College
- Jaelyn Walters, Casper College

$5,000 Award Recipients

- Autum Auxier, Ball State University
- Serena Lewis, University of Denver
- Alberto Montemayor *(not pictured)*, Southern Methodist University
- Dylan Neutgens, Montana Tech
- Jailyn Smith *(not pictured)*, Mississippi State University

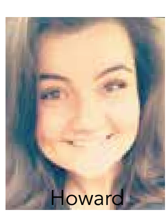
AISC Scholarships for Juniors, Seniors and Masters-Level Students

AISC Education Foundation

- Joseph Arehart, University of Colorado Boulder
- William Bader, University of Illinois at Urbana-Champaign
- Ethan Baker, University of Arkansas
- Leon Collins, The College of New Jersey
- Kathryn Eckhoff, Northwestern University
- Eric Fleet, Oklahoma State University
- George Grzywacz Jr., University of Michigan
- Anna Harris, Santa Clara University
- Nicholas Heim, Case Western Reserve University
- Derek Hibner, Michigan State University
- Sara Ibarra *(not pictured)*, University of Washington
- Jacob Linford, University of California, San Diego
- Duncan MacLachlan, The University of Kansas
- Jackson Mahrt, Arizona State University


Beveridge


Cash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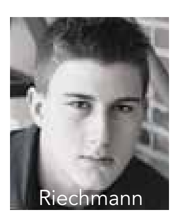
DeVos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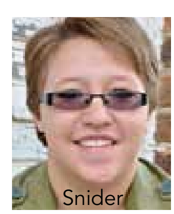
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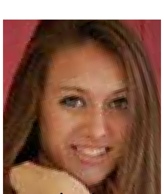
Templeton


Walters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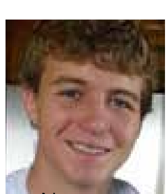
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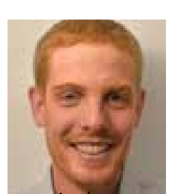
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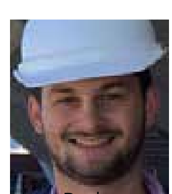
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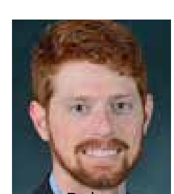
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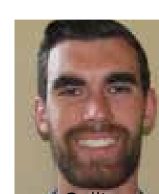
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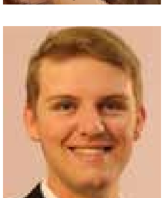
Eckhoff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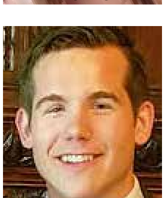
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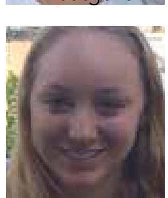
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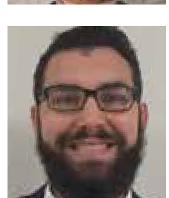
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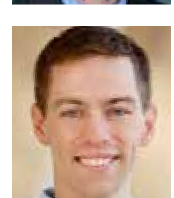
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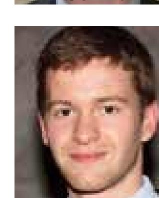
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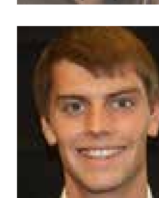
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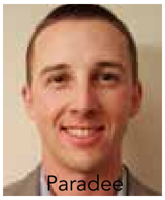
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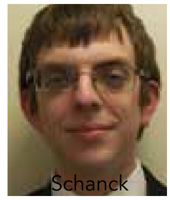
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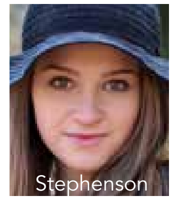
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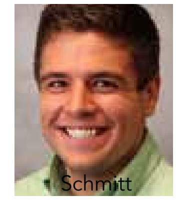
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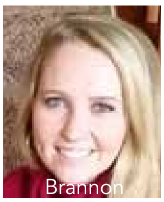
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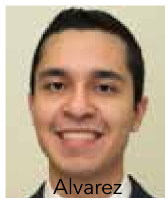
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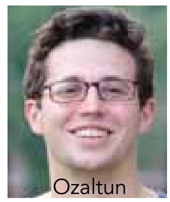
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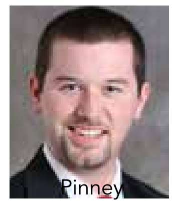
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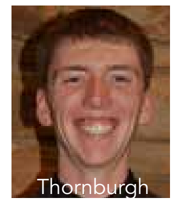
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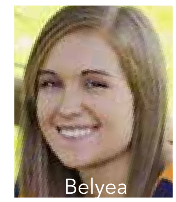
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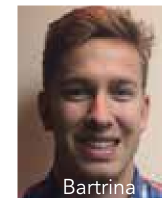
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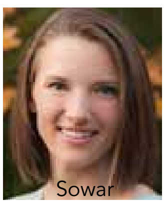
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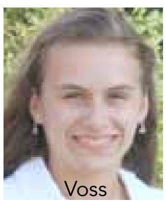
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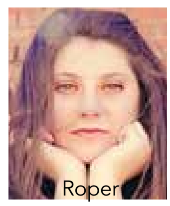
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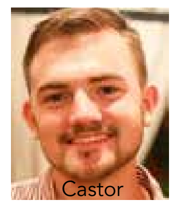
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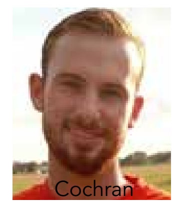
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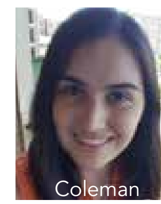
Coleman

Stephens

AISC Education Foundation *(cont.)*
- Caleb Mitchell, Kansas State University
- Jerren Paradee, University of Washington
- Lauren Santullo, The College of New Jersey
- Andrew Schanck, The University of Maine
- Melanie Stephenson, Colorado School of Mines
- Andrew Unander, Massachusetts Institute of Technology

AISC/Great Lakes Fabricators & Erectors Association
- Joseph Schmitt, Michigan Technological University

AISC/Ohio Structural Steel Association
- Kamron Skaggs, University of Cincinnati

AISC/Rocky Mountain Steel Construction Association
- Joseph Arehart, University of Colorado Boulder

AISC/Southern Association of Steel Fabricators
- Alison Brannon, University of Kentucky
- Jacob McCranie, Georgia Southern University

AISC/Associated Steel Erectors of Chicago
- Joseluis Alvarez, University of Illinois at Chicago
- William Bader, University of Illinois at Urbana-Champaign
- Kathryn Eckhoff, Northwestern University
- Bora Ozaltun, University of Illinois at Urbana-Champaign
- Joshua Pinney, Rose-Hulman Institute of Technology

AISC/Technical Committee on Structural Shapes
- Lauren Santullo, The College of New Jersey
- Andrew Schanck, The University of Maine
- Travis Thornburgh, University of Iowa

AISC/Indiana Fabricators Association
- Kristen Belyea, Rose-Hulman Institute of Technology
- Gerard Guell Bartrina, Indiana University-Purdue University Fort Wayne
- Madalyn (Maddy) Sowar, University of Notre Dame
- Megan Voss, Valparaiso University

AISC/W&W Steel/ Oklahoma State University
(Program includes sophomores, juniors and seniors)
- Matthew Mestre, Civil Engineering
- Kaylee Roper, Architectural Engineering
- Randall Castor, Construction Management
- Dillon Cochran, Civil Engineering
- Alexa Coleman, Architectural Engineering
- Lauren Breedlove *(not pictured)*, Civil Engineering
- Jose Reyna *(not pictured)*, Construction Management
- Kennedy Stephens, Architectural Engineering

The AISC Scholarship jury consisted of the following individuals:
- Benjamin Baer, Baer Associates Engineers, Ltd.
- David Bibbs, Cannon Design
- Christopher Brown, Skidmore Owings & Merrill, LLP
- Christina Harber, AISC
- Luke Johnson, American Structurepoint
- Colleen Malone, H.W. Lochner, Inc.

The David B. Ratterman Scholarship jury consisted of the following individuals:
- Brad Bourne, AISC Education Foundation Chair
- Lawrence Cox, AISC Board Member
- Babette Freund, AISC Board Member
- Lawrence Kruth, AISC Board Member
- Patrick Leonard, AISC Board Member
- Rex Lewis, AISC Past Chair
- David B. Ratterman, AISC General Counsel

ENGINEERING JOURNAL

Fourth-Quarter *Engineering Journal* now Available

The fourth-quarter 2016 issue of *Engineering Journal* is now available at **www.aisc.org/ej**. Articles in this issue include:

➤ **Stability of Rectangular Connection Elements**
Bo Dowswell
Connection elements are commonly designed using the flexural buckling and lateral-torsional buckling provisions in AISC *Specification* Sections E3 and F11, respectively, as well as the combined-load requirements of Section H1. Because these provisions were developed for main members, their accuracy for designing connection elements is questionable. The factors affecting the stability of connection elements are discussed, with an emphasis on the differences between main members and connection elements. The available experimental and theoretical results are compared to the AISC *Specification* equations. Where required, new equations are derived, and practical design solutions are recommended. Recommendations are also made for connection elements subjected to combined axial and flexural loads. Examples are provided to illustrate the proposed design procedures for double-coped beams.

➤ **Dynamic Shear Strength of Riveted Structural Connections**
Christopher P. Rabalais and C. Kennan Crane
Riveted lap-spliced specimens were tested to observe how the fasteners' shear strengths were affected by joint configuration, number of shear planes, and loading type. A 200,000-lbf-capacity dynamic loader was used to fail the specimens under a monotonic dynamic or monotonic quasi-static load. The test data were normalized by the number of shear planes loaded in each test and estimated ultimate tensile strength of the driven rivet. A statistical analysis was conducted to determine the significant factors affecting the fastener shear strength. Conclusions from the analyses indicated that the loading type has the most significant effect on shear capacity, resulting in a dynamic increase factor of 1.72 relative to the rivet's quasi-static shear capacity.

➤ **Updates to Expected Yield Stress and Tensile Strength Ratios for Determination of Expected Member Capacity in the 2016 AISC *Seismic Provisions***
Judy Liu
The expected yield stress and expected tensile strength ratios for hollow structural sections (HSS), pipe, and steel reinforcement for steel-concrete composite construction have been updated for the 2016 AISC *Seismic Provisions for Structural Steel Buildings*. For HSS, each grade of steel, including the new ASTM A1085 specification, has its own R_y and R_t values. Expected yield stress and tensile strength ratios have also been defined for different grades of steel reinforcement. The revisions were based on analysis of mill test data for HSS and pipe from a number of producers and a comprehensive mill survey conducted by the Concrete Reinforcing Steel Institute (CRSI).

➤ **Steel Structures Research Update Steel-Concrete Composite Beams at Ambient and Elevated Temperatures**
Judy Liu
Ongoing and recently completed research on steel-concrete composite beams and floor systems at ambient and elevated temperatures is presented. The research highlighted here includes investigations into shear connector slip, composite beams with high-strength steel, and tests of real-scale composite floor systems subjected to fire and structural loading.