PUBLICATIONS

Structural Stainless Steel Design Guide now Available

U.S. design professionals now have an authoritative resource on structural stainless steel in AISC Steel Design Guide No. 27, *Structural Stainless Steel*, authored by Nancy Baddoo, associate director of the Steel Construction Institute (SCI), U.K. This new publication provides guidance for the design of structural hot-rolled or welded open sections such as wide-flange members, channels and equal-leg angles, as well as rectangular and round hollow structural sections (HSS).

"Up until now, there have been no specifications or guidelines for the design of structures fabricated from hot-rolled stainless steel plates or shapes," said Ted Galambos, P.E., Ph.D., emeritus professor of structural engineering at the University of Minnesota in Minneapolis and a reviewer of Design Guide No. 27. "This document, for the first time in the U.S., will show designers how to proportion stainless steel beams, columns, frames and connections that are fabricated from hot-rolled components. With this new design guide, it will be an easy task to expand the arsenal of engineers."

The publication is intended for engineers experienced in the design of carbon steel structural components, but not necessarily in the design of stainless steel structures, and is aligned with the design provisions in the 2010 AISC *Specification for Structural Steel Buildings*. It applies to austenitic, duplex and precipitation hardening of stainless steel structural sections with a thickness of ⅛ in. (3 mm) and greater.

The major topics covered in this guide are material behavior and selection, cross-section design, member design, connections and fabrication. Design examples are also included.

In addition to AISC and SCI, the following groups assisted in the creation of Design Guide No. 27: International Chromium Development Association (ICDA), International Molybdenum Association (IMOA), International Stainless Steel Forum (ISSF), Nickel Institute, Outokumpu, Specialty Steel Industry of North America (SSINA), Stainless Structurals LLC, Stalatube and the Steel Institute of New York (SINY).

The new design guide is available for free to AISC members and $60 for nonmembers in electronic format at www.aisc.org/dg. The printed copy is also available at this link or by calling 800.644.2400 (product code: AISC 827-13); the cost for the printed copy is $40 for members and $80 for nonmembers.

PUBLICATIONS

Certification Standard for Structural Steel Erectors Available as a Free Download

The new AISC standard for structural steel erector certification is available for free at www.aisc.org/specifications (under Certification Standards at the bottom of the web page). Formally titled AISC 206-13, *AISC Certification Program for Structural Steel Erectors—Standard for Structural Steel Erectors—2013*, the standard outlines the requirements for a structural steel erector's quality management system.

The new standard is the culmination of several years of work by the AISC Certification Standards Committee and a special subcommittee created to draft the standard. The standard is modeled after existing AISC certification standards. "The erector standard was written with significant input from erectors," noted Ted Shepard, chairman of the Ad Hoc Committee on the Erector Standard. "We spent a great deal of time developing requirements that make good firms even better."

AISC Certification is in the process of preparing the Erector Certification program requirements that will accompany this standard and will announce the schedule and process for transition from the existing checklist at the NASCC: The Steel Conference in March. "The application of quality management system principles to structural steel erection is a natural extension of AISC's move towards quality management system standards," added Jacques Cattan, AISC vice president.

To learn more about AISC Certification Programs, visit www.aisc.org/certification.

People and Firms

- **Kimberly Robinson**, S.E., chief engineer of **Star Seismic** (AISC member), has been named Engineer of the Year 2013-2014 by the **Structural Engineers Association of Utah (SEAU)**, making her their official nominee for the **Utah Engineers Council (UEC)** award of the same title.
- **SidePlate** (AISC member), a **Berkshire Hathaway** company that designs steel building connections, recently announced that it has doubled its employee base in the last 36 months to accommodate rising demand for its consulting and project-management services. As another indicator of the company's growth, SidePlate's active projects have more than doubled since July 2010.
- **Design Data**, in cooperation with **Nemetschek Scia**, has developed a bidirectional link that allows steel fabricators to view in real-time the production status of parts and assemblies in an SDS/2 steel BIM, as well as allow production to automatically view the status of any changes that occur in design. For more information on the link, Nemetschek's Scia Steel Manager, visit www.nemetschek-scia.com/en. For more information on SDS/2, visit www.sds2.com.
- **Matt Carter**, associate principal with **Arup**, has relocated from Hong Kong to the firm's New York office to assume the position of Americas Long Span Bridge Leader. In this role, Matt will be responsible for growing the firm's regional long-span bridge capability while responding to opportunities in the marketplace, especially in the design-build sector.

DESIGN COMPETITION

Winners Announced in ACSA/AISC Steel Design Student Competition

AISC and the Association of Collegiate Schools of Architecture (ACSA) have announced the winners of the 13th annual steel design student competition for the 2012-2013 academic year. Administered by ACSA and sponsored by AISC, the program challenged students, working individually or in teams, to explore a variety of design issues related to the use of steel in design and construction.

The competition included two categories. Category I (Bridge to Building) challenged architecture students to design a pedestrian bridge that would enrich its location and provide a vital spatial connection. Category II (Open) allowed for any building type. For both categories, steel had to be used as the primary structural material and the project had to contain at least one space that required a long-span steel structure. Here are the winners for both categories:

Category I: Bridge to Building

First Place:

- "Stream_Line"
  Students: Christopher Garrow, Heather Martin and Kaitlin Shenk
  Faculty Sponsors: Donald Dunham, Brian Johnston, Thomas Kirchner, Lisa Phillips and Barbara Macaulay
  School: Philadelphia University

Second Place:

- "Adaptive Connections"
  Students: Vahe Markosian, Andrew Maier III, Mark Pothier and James P Stoddart
  Faculty Sponsors: John D Cerone and Adam Modesitt
  School: Columbia University

Third Place:

- "Building [Equilibrium] Bridge"
  Student: Javier Bidot-Betancourt
  Faculty Sponsor: Jose Lorenzo-Torres
  School: Polytechnic University of Puerto Rico

Honorable Mentions

- "[PORT]al Memorium"
  Students: Kamilah Acebal and Sophie Juneau
  Faculty Sponsor: Edgar Sarli
  School: University of Miami
- "The Introduction of Force to Minimalize Material"
  Students: Jason Baiocchi and Jeremy Riback
  Faculty Sponsor: Christopher D. Trumble
  School: University of Arizona
- "Bridge Over | Pass Under"
  Student: Chad Guempel
  Faculty Sponsor: Genevieve Baudoin
  School: University of Kansas
- "Berkeley Bridge"
  Students: Jonathan Chiang and Jarvis Gene Lee
  Faculty Sponsor: Gary Black
  School: University of California, Berkeley

Category II: Open

Prize Winner:

- "Injection"
  Student: Trevor Larsen and Ben Pennell
  Faculty Sponsor: Thomas Fowler IV
  School: California Polytechnic State University

Prize Winner:

- "Inverted Landscape"
  Students: Byron Marroquin and Sal Vargas
  Faculty Sponsor: Joshua G. Stein
  School: Woodbury University

Honorable Mentions

- "Synchronous Paths—Toward a Center for Autism"
  Students: Sarah Limbocker, Marcia Trein, Lina Burnett and Sunyoung Kim
  Faculty Sponsor: Bruce Johnson
  School: University of Kansas
- "Quilt of enLIGHTenment"
  Student: Danielle Aspitz
  Faculty Sponsor: Thomas Fowler IV
  School: California Polytechnic State University
- "Inflate: An Expression of Information Use in Bayview, San Francisco"
  Student: Max Wisotsky
  Faculty Sponsor: Thomas Fowler IV
  School: California Polytechnic State University

For more information on the winners, as well as images, visit **www.aisc.org/content.aspx?id=796**.

NASCC

Registration for 2014 NASCC: The Steel Conference Opens this Month

Registration for the 2014 NASCC: The Steel Conference opens November 18. Taking place in Toronto, March 26-28, the 2014 conference will offer more than 100 technical sessions, 200 exhibitors and plenty of networking opportunities. AISC members can register for just $300 during the week of November 18. But be sure to register early; the rate increases $10 every week until the conference opens, when the price becomes $480. This single registration fee gains you entry to all technical sessions, the exhibition hall, the keynote address and the T.R. Higgins Lecture. It also includes admission to all Structural Stability Research Council, Technology in Steel Construction Conference and World Steel Bridge Symposium sessions. The main conference offers up to 18.5 PDHs; attendees of short courses can earn an additional 4 PDHs. This year's keynote speaker is Neil Pasricha. His book, *The Book of Awesome*, is a #1 international bestseller and his lecture, "1,000 Awesome Things," will touch upon his project of posting one awesome thing every weekday for 1,000 consecutive weekdays—and he'll teach you how to bring awesome principles to life in your organization. The T.R. Higgins Award Lecture, "Statics, Strength, Ductility, and the Uniform Force Method," will be presented by Larry S. Muir of the Steel Connection, LLC. Visit **www.aisc.org/nascc** to register and view the advance program. We'll see you in Toronto (and don't forget your passport)!

ENGINEERING JOURNAL

Fourth Quarter *Engineering Journal* Now Available

The fourth quarter 2013 edition of *Engineering Journal* is now available at **www.aisc.org/ej** (past issues are also available at this link). Papers in the Q4 issue include:

- **Torsional and Constrained-Axis Flexural-Torsional Buckling Tables for Steel W-Shapes in Compression**
  Di Liu, Brad Davis, Leigh Arber and Rafael Sabelli

Torsional buckling (TB), an applicable limit state for W-shape members subject to axial compression, often controls when the torsional effective unbraced length exceeds the minor-axis flexural buckling effective unbraced length. Constrained-axis flexural-torsional buckling (CAFTB) is a potential limit state for W-shape members that are constrained to buckle with the center of twist at a location other than the centroidal axis, as is the case for a typical beam with one flange braced by a diaphragm and the other unbraced. Manual calculation of the TB or CAFTB available compressive strength is a somewhat lengthy process, especially when the section is slender for axial compression, and no design aid currently exists in the AISC *Manual*. This paper provides tables that facilitate the determination of TB and CAFTB available compressive strengths. Several example calculations are also provided.

Keywords: members, columns, stability, buckling, torsion

- **Experimental Investigation of Mechanical Properties of ASTM A992 Steel at Elevated Temperatures**
  Jinwoo Lee, Mohammed A. Morovat, Guanyu Hu, Michael D. Engelhardt and Eric M. Taleff

This paper presents the results of a detailed experimental study into the mechanical properties of ASTM A992 structural steel at elevated temperatures. Critical testing issues, including temperature measurement, temperature control and extensometer use along with the testing equipment and procedures are briefly explained. Tensile steady-state temperature tests are conducted on samples of ASTM A992 steel at temperatures up to 1,000 °C. Full stress-strain curves, representing steel coupons tested to fracture at elevated temperatures, are generated. Important mechanical properties such as yield stress, tensile strength, proportional limit, elastic modulus and elongation are obtained from the stress-strain curves. Results are compared with elevated-temperature properties specified by Eurocode 3 and by the AISC *Specification*. When defined as the stress at 2% total strain, the measured yield stress values agree reasonably well with the corresponding values from Eurocode 3 and the AISC *Specification*. However, for more conventional definitions of yield stress, such as the 0.2% offset yield stress, the agreement is poor. It is observed that the yield stress of steel at elevated temperatures up to about 600 °C is highly dependent on the manner in which yield stress is defined. The effects of displacement loading rates on steel strength and static yielding behavior are also investigated. It is shown that the displacement rate has a large impact on the steel strength at elevated temperatures, especially at temperatures higher than 600 °C. Further work is needed to fully characterize the time-dependent effects on the elevated-temperature stress-strain response of structural steel. Additionally, this paper presents results of Charpy V-Notch (CVN) tests on ASTM A992 steel at elevated temperatures.

Keywords: ASTM A992 steel, mechanical properties, retention factors, elevated temperatures, structural-fire engineering, fire safety

- **Structural Fire Engineering: Overview and Application Examples of Appendix 4 of the AISC *Specification***
  John Gross, Nestor Iwankiw and Matthew Johann

This paper presents an overview of current conventional practices for providing passive fire protection of building structures and describes alternative engineering approaches covered in Appendix 4 of the 2010 AISC *Specification*, ANSI/AISC 360-10. The concept of structural fire engineering is discussed, along with guidance and design references that are available to support performance-based structural fire engineering analyses. The roles and responsibilities typically assumed by design team members and other stakeholders in a structural fire engineering project are presented, as are considerations associated with peer reviews and approval by authorities having jurisdiction. The paper concludes with a series of four design examples that demonstrate a range of structural fire engineering applications for steel buildings.

Keywords: fire, structural fire engineering, performance-based fire design, fire engineering, AISC *Specification* Appendix 4

- **Current Steel Structures Research No. 34**
  Reidar Bjorhovde