

Parking Design Guide Available

AISC's *Design Guide 18: Steel-Framed Open-Deck Parking Structures* is now available! This text provides designers with a complete introductory reference for the design of steel-framed, open-deck parking structures. It focuses on the design of deck and framing systems, fire protection, and corrosion protection for parking structures.

"There's an increasing trend towards steel-framed parking structures," explained Bill Pascoli, a National Project Manager at AISC. "This *Design Guide* provides both technical information and design examples, which will help the structural engineer with strength and serviceability parameters."

For a limited time, **free** copies of the *Design Guide 18* (normal price is \$39) are available from AISC. Copies can be requested by visiting www.aisc.org/parkingguide, or by calling 866.ASK.AISC.

Other free AISC parking-related publications include:

- *Innovative Solutions in Steel: Open-Deck Parking Structures*;
- *Innovations in Steel Parking Structures Around the World*; and
- *Steel Framing Solutions for Parking Structures*.

To download free copies of these publications, or to learn more about steel-framed parking structures, visit www.aisc.org/parking. ★



The 2004 Steel Conference – Long Beach, CA

The 2004 North American Steel Construction Conference (NASCC) is set for March 24-27 in Long Beach, CA—and will feature innovations in structural steel engineering, fabrication, detailing and erection. This once-a-year event is an opportunity for design and construction professionals to learn how to apply the latest technology and techniques to everyday work; to discover product offerings from leading industry vendors; and to network with peers, customers and future employees. This year's Steel Conference also incorporates the 2004 Pacific Structural Steel Conference and the 2004 Annual Stability Conference.

Don't miss presentations by industry experts on topics like design of buckling-restrained brace frames, how to select cranes and rigging, comparison of steel detailing methods with Pacific Rim Countries, and the new AISC Building Standard for Fabrication. Speakers include Larry Kloiber, Dave Ruby, Pete Carrato, Jon Magnusson, Sam Easterling, Mike West, Larry Griffis, Mark Holland, Rafael Sabelli, Eddie Williams, and many others. See the advance program in the November 2003 issue of MSC.

The NASCC is also the ideal place to view the tools you use everyday. This year's exhibit hall expects to feature more than 135 exhibits. Displays include software (engineering, detailing and fabrication), fabrication equipment, bolts, safety equipment, coatings, and much more. Look out for full demonstrations of equipment—and don't miss the crane simulator, which gives you the change to experience first-hand what steel erection is all about!

This year's NASCC offers more than 50 technical sessions for structural engineers, fabricators, detailers, and erectors. It also features:

- The Pacific Structural Steel Conference: a technical conference including more than 30 papers and poster presentations from leading Pacific Rim researchers and practitioners.
- The Stability Conference: The Structural Stability Research Council's (SSRC) annual conference, including

the 2004 Beedle Award Paper Presentation

- Short Course on fire resistance of structural steel framing
- Short Course on fabricator tools to increase profitability
- Short Course on basic design for stability-columns and frames
- Tutorial on field fixes
- Tutorial on seismic design and the 2002 AISC seismic provisions

Join 2,500 of your peers for the steel industry's biggest event! Register online at www.aisc.org/nascc. ★



Professional Member Forum: 2005 Specification

Don't miss the AISC Professional Member Forum on Wednesday, March 24, 2004 at 10:00 a.m. at the NASCC. The topic of discussion will be the 2005 AISC *Specification for Structural Steel Buildings* and the accompanying *Manual of Steel Construction*. James Fisher of Computerized Structural Design and Chairman of the AISC Committee on Specifications will be on hand to discuss the content of the two new AISC publications, currently under development. All AISC Professional Members are invited to attend. Please e-mail Janet Cummins at engineering@aisc.org if you plan to attend. ★

CMAA Foundation Scholarships

The Construction Management Association of America (CMAA) Foundation is accepting scholarship applications for the 2004-2005 school year until April 15, 2004. Students who will be enrolled in an undergraduate or graduate ACCE-accredited construction-degree program next school year are eligible. Scholarship applications can be downloaded from www.cmaanet.org. Students do not have to be CMAA members to apply. The CMAA Foundation will announce scholarship recipients in September at the National Conference in San Antonio, TX. ★

Apply for AISC's Scholarships & Fellowships

Students, help your finances—apply for an AISC scholarship or fellowship! Select a scholarship and/or fellowship that is applicable to you.

2004 Undergraduate Scholarships

AISC/Carolina Steel	\$3,000
AISC/Southern Association of Steel Fabricators	\$2,500
AISC/Associated Steel Erectors of Chicago	5 × \$3,000
AISC/Indian Fabricators	3 × \$500
AISC/Fred R. Havens	\$5,000*

Fellowships for Graduates

AISC/Structural Steel Fabricators of New England	\$3,000
AISC/US Steel	\$2,500
AISC/Klingelhofer	\$2,500
AISC/Great Lakes Fabricators & Erectors Association	\$5,000
AISC/Southern Association of Steel Fabricators	\$2,500
AISC/Rocky Mountain Steel Construction Association	\$3,000
AISC/Fred R. Havens	\$5,000*
AISC/Structural Steel Education Council	\$4,000

*The AISC/Fred R. Havens award is offered either as an undergraduate scholarship or as a graduate fellowship.

The deadline for applications is April 16, 2004. Applications can be downloaded from www.aisc.org. For more information contact Fromy Rosenberg at 312.670.5408 or rosenberg@aisc.org; or contact Kelly Mullins at 312.670.5442 or mullins@aisc.org. ★

2004 Architectural Seminar Series

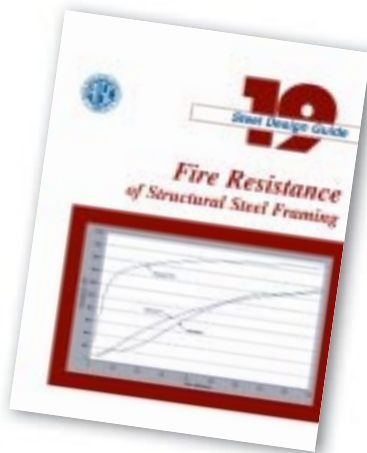
SMI Steel Products, in cooperation with AISC Marketing, eSteel, and Girder-Slab® Technologies, presents its 2004 Architectural Seminar Series, "Innovations in Steel," in 23 cities nationwide. This half-day seminar consists of steel industry experts presenting the following topics: sustainability, AESS, project-delivery innovations, SmartBeam®, the Girder Slab® system, and the EDI process. Each attendee receives design guides

Fire Design Guide Available

AISC's *Design Guide 19: Fire Resistance of Structural Steel Framing* is now available! The guide covers the design of fire-resistant steel framing, including building code requirements, fire-protection methods and materials, standard fire-resistance tests, and the associated rating system.

This design guide provides detailed guidance for the selection of rated designs for columns, beams, and trusses, as well as design examples and W/D tables for common protection configurations.

Design Guide 19 and other AISC publications are available to AISC members and ePubs subscribers for free download from AISC's web site, www.aisc.org/epubs. You can also purchase publications through AISC's online bookstore, www.aisc.org/bookstore or by calling 800.644.2400. ★



AISC's ePubs with Professional Membership

Structural steel information is just a few clicks away with ePubs, an electronic collection of AISC's technical publications on the AISC web site. AISC members and subscribers are granted unlimited ePubs access: Adobe Acrobat (PDF) versions of *Engineering Journal* articles from 1964 to the present, conference proceedings from 1954 to the present, all AISC *Design Guides*, and the AISC Shapes Database in MS Excel format. Members and subscribers still receive free AISC materials, including the *Architects Guide for Designing in Steel*, AISC codes and specifications, Steel Tools, Innovative Ideas in Steel, access to the Steel Availability database, and *Modern Steel Construction*.

The ePubs package is available to all professional members. All you need to do is log-on to the AISC web site. For those who are not yet AISC professional members, now is a good time to become one! AISC has modified its dues structure to make this an affordable opportunity.

Professional Membership

No. of Staff	Total Annual Cost
1	\$ 135
2-6	\$ 160
7-19	\$ 200
20-99	\$ 300
100-499	\$ 500
500-1000	\$ 1,000

In addition to ePubs access, AISC members enjoy substantial discounts on printed publications and seminar and conference registrations. For example, members receive a \$125 discount on their registration for the North American Steel Construction Conference.

Professional Membership in AISC is limited to engineers and architects. Those not eligible for membership can access ePubs through a \$300 annual subscription. Active Members and Associate Members also can benefit from ePubs by providing access to their dependents. If you have any questions about ePubs or AISC membership, please e-mail membership@aisc.org or call 312.670.5446. ★

2004 T.R. Higgins Lecture—Orthogonal and Skewed Shear Connections

Lawrence A. Kloiber, P.E. is the winner of AISC's 2004 T.R. Higgins Lectureship award. Kloiber will present his paper, "Orthogonal and Skewed Shear Connections—Design and Detailing Requirements" on Friday, March 26, 2004 at the NASCC in Long Beach, CA. Kloiber has been involved in designing, fabricating and erecting structural steel for almost 40 years; first as an AISC Engineer and then with LeJeune Steel Co. He has directed the connection design and fabrication of projects such as the Minneapolis Convention Center and the Mall of America, along with work on numerous high-rise office buildings, arenas, and industrial buildings.

"When I think of him, I think of a first-class individual," said James M. Fisher, a long-time colleague and president of Computerized Structural Design. "He has volunteered and contributed his time unselfishly for many years to AISC, ASCE, AWS and other organizations. Even very good engineers will call Larry for advice on fabrication, steel erection and connection design."

The T.R. Higgins Lectureship Award recognizes an outstanding lecturer and author whose technical paper or papers are considered an outstanding contribution to the engineering literature on fabricated structural steel. In addition to recognition, the recipient receives a \$10,000 cash award.

The award is named for Dr. Theodore R. Higgins, former AISC Director of Engineering and Research, who was widely acclaimed for his many contributions to the advancement of engineering technology related to fabricated structural steel. The award honors Dr. Higgins for his innovative engineering, timely technical papers and distinguished lectures. For more information on the award, visit www.aisc.org/higgins.

Larry is a graduate of Marquette University, a member of the AISC Committee on Specifications, the AWS D1.1 Code



Lawrence A. Kloiber

Committee and the Research Council on Structural Connections. He is an ASCE Fellow and member of the SEI Committee on the Design of Steel Building Structures. ASCE presented him its "Practitioner in Service" certificate in 1998 in recognition of his service to the University of Minnesota Department of Civil Engineering. Larry is the author of several papers on the design, fabrication and erection of structural steel. In September 2002, AISC presented Larry with a Lifetime Achievement Award in "Special recognition for many years of service to the structural design, construction, and academic communities."

"He deserves the T.R. Higgins award for his efforts and contributions to the betterment and use of structural steel over the years," Fisher said. "Larry is a wonderful man and a good friend. Even though he's a Minnesota Vikings fan." ★

2004 Regional Student Steel Bridge Competitions

REGION	HOST UNIVERSITY	DATES
Carolinas	Clemson University	April 2-3
Deep South	University of Mississippi	March 25-27
Great Lakes	Milwaukee School of Engineering	April 29-May 2
Metropolitan	NY City College of Technology (at NJ Institute of Technology)	April 24-25
Mid-Atlantic	Pennsylvania State University	April 23-24,
Mid-Continent	University of Nebraska-Lincoln	April 22-24
Mid-Pacific	University of Nevada-Reno	April 23-25
North Central	University of Akron	April 2-3
Ohio Valley	University of Pittsburgh	April 1-4
Pacific Northwest	Oregon Institute of Technology	April 2-4
Pacific Southwest	California Polytechnic State University— San Luis Obispo	April 1-3
Rocky Mountain	Colorado State University	April 1-3
Southeast	University of South Florida	March 18-20
Texas - Mexico	Lamar University	January 16-17
Upstate New York	SUNY-Buffalo	April 23-24
Virginias	West Virginia University	April 1-3, 2004

AISC Offers Free Downloadable RAM Estimator V2.0

RAM Estimator v2.0 is a new spreadsheet program that helps steel fabricators, contractors, and designers quickly approximate the structural framing cost for a steel building. Available from AISC at no charge, RAM Estimator is the latest in a group of free, downloadable, Steel Tools™ available at www.aisc.org/steel-tools. A Visual Basic-enhanced Excel file, RAM Estimator works with the RAM Structural System and allows the user to compare the steel quantities of framing options as well as the cost implications of each scenario.

The user begins by designing the structure using the RAM Structural System and then uses the RAM Estimator to estimate the overall frame cost of the building. RAM Estimator allows the user to enter cost data for steel weight, shear studs, moment and brace connections, cambering of a beam and much more. The cost data is applied to the quantities determined from a RAM Structural System analysis file.

Using the RAM Estimator, the speed and power of the RAM Structural System is extended to include timely cost estimates as well as steel quantities. The user can rely on their expertise or that of their consultants. They also may contact AISC's Steel Solutions Center for additional cost and schedule information.

Other free Steel Tools™ include:

Parametric Bay Studies v4.1

This tool helps engineers answer questions such as: "Is it less expensive to increase the size of the beams than to camber?" and "Is it more efficient to frame the beams in the long direction or the short?" Parametric Bay Studies v4.1 designs a typical bay in a composite steel framed structure and optimizes the design for either the overall weight or the relative cost of the framing system.

Clean Columns v3.1

Clean Columns helps engineers reduce the overall cost of steel framing on their project in a matter of minutes by comparing the cost of stiffening the connection to the cost of the additional

Upcoming AISC 2004 Spring Seminars

AISC is offering an series of new educational seminars this spring. Bring a buddy for only \$100! Visit www.aisc.org/seminars or see the ad on page 14 for dates and locations.

Basic Design for Stability—Columns and Frames

AISC and SSRC offer this six-hour program on the compressive strength of columns and frames, and buckling. The seminar provides background to understand the stability provisions in the AISC *Specification* and methods of stability analysis outlined in the AISC Commentary. There will be a strong emphasis on applications through the use of example problems and case studies.

Bolting and Welding Primer

Part I: Welded Connection Design offers an introduction to the basics of welded connection design. Part II: Fundamentals of High-Strength Bolting provides information on how to select suitable high-strength bolts, specify the methods of their installation and inspection, and understand the rules in the AISC *Specification*.

Field Fixes: Common Problems in Design, Fabrication and Erection—Solutions and Prevention

Authored by Jim Fisher and Larry Kloiber, this seminar premiered at the 2003 NASCC in Baltimore. The course discusses common design, fabrication, and construction problems that occur on structural steel projects. Solutions to recurring problems and suggestions to prevent problems from occurring will be presented. Included will be a discussion of the necessary

procedures and documentation to verify that revisions comply with design requirements, and have been properly made and inspected. The attendee will leave the seminar better equipped to solve and prevent errors in his or her structural design.

Load and Resistance Factor Design of Steel Structures

This short course will provide practical knowledge to start using LRFD in your design office. If your company is transitioning from ASD to LRFD, this course will give you the basic LRFD tools to succeed. Or if you need to shortcut the learning curve, this course is the ideal vehicle for you. The program also is important for those using the new AISC Seismic Provisions, which were written with LRFD in mind.

Seismic Design and the New 2002 AISC Seismic Provisions

This seminar provides an overview of the new 2002 AISC *Seismic Provisions for Structural Steel Buildings*, the preeminent reference for seismic design of structural steel buildings adopted by reference by the model building codes. This edition contains substantial revisions to the design provisions and a rewritten commentary that builds on lessons from recent earthquakes and research. This seminar will update the experienced seismic designer and introduce the provisions to those with limited experience. Upon completion of the seminar, you will know what the changes are, where to find them in the provisions, and their implications. ★

steel due to increasing the member size. Clean Columns v3.1 calculates the minimum weight column section that can be used without stiffeners and/or doubler plates to develop a specified percentage of a selected beam's plastic moment capacity based on the criteria in AISC *Design Guide 13*. ★



Remember to register for NASCC 2004!

www.aisc.org/nascc

Steel Statement

by Bob King and Linda Norris

Architecturally exposed structural steel (AESS) was used to articulate company vision in the new headquarters of Lindhout Associates, an architectural firm in Brighton, MI. The 45-year-old architectural firm planned to use AESS to illustrate both the vision and the design possibilities of the company's architectural team. A series of curved supertrusses, referred to as "serpentine joists" define the 9,148-sq.-ft office building and visually demonstrate a key element of the firm's mission.

The company had outgrown its most recent building, which it had occupied since 1991. The group began developing a new office design to reflect their culture of diversity, integrity, innovation and teamwork. It took some time to pinpoint the appropriate structural system. Proposals included an exposed timber design that the firm did not feel represented its high-tech image.

Instead, structural steel showcases a 21st-century vision. The setting is over-arched by serpentine supertrusses approximately 55' long and 13' deep, with transverse framing consisting of reversed bowstring joists (see photo).

The top-chord profile typically is made with one pair of angles. However, for the serpentine joists, the angles had to be spliced. For these, the top-chord profile was fabricated using five pairs of L5x5s. The two rolled sections were rolled in the opposite direction, but with the same radius. Then, the flat angles had to be spliced to the rolled angles.

The fabrication process was challenging for the joist fabricator because the splice location was required to appear to have a smooth transition from flat to curved. For the bottom chords, fabrication required three pairs of angles. The bottom chords, consisting of L4x4s, joined to the top chords using a plate extended from the bearing, leaving just a small gap between the top and bottom chords.

The five serpentine are actually girders with upside-down bowstring joists "set" between them, with the bowstrings perched on shelf angles that are part of the verticals. This allows the



bowstrings to have the same top-chord elevation as the serpentine trusses at the given location.

The Lindhout team chose to look at the architectural studio as the heart and soul of the building. Its wide-open feel allows for team interaction and the "soaring of infinite imagination," said King.

"Geometrically, it was something that took some studying when we first looked at it," said Canam Midwest Joist Engineering Manager Tim Holtermann, P.E. "We met with Lindhout and came away realizing they are trying to make a statement both inside and outside. So we worked it out dimensionally."

The roof shape created unusual gravity loading. Structural engineers L & A Incorporated of Farmington Hills, MI accounted for this by resolving an equivalent uniform load to simplify the specifications of the joists.

The loads were transferred through a system of two joist girders to steel HSS columns, provided by AISC-member Art Iron, Inc. of Toledo, OH.

The serpentine supertrusses also act as part of the lateral bracing system for the building because they are part of the roof diaphragm. Loads were resolved into the supporting structure as part of the detailing of the project.

RAM Structural System programs were used to model the roof system and the imposed loads. RAM also was used to calculate required load combinations so that an equivalent uniform load could be calculated. The serpentine joist was

detailed dimensionally using Auto CAD 2000 and the design was completed using SAFI.

Beyond the studio space, the project includes a library/warehouse with a second-floor mezzanine, offices, a reception area, conference rooms, a dining area, and telecomm room.

Overall, the new facility provides an inspirational environment, King said. Steel makes an architectural statement that Lindhout Associates and their team of engineers, fabricators and contractors draw from to think and work "outside the box." ★

Bob King is vice president and project architect of Lindhout Associates. Linda Norris is communications manager for Canam Steel Corporation. For more information on AESS, visit www.aisc.org/laess.

Architect

Lindhout Associates, Brighton, MI

Structural Engineers

L & A Incorporated, Farmington Hills, MI

Steel Fabricator

Art Iron, Inc., Toledo, OH
(AISC member)

Steel Joist Supplier

Canam Steel Corporation, Point of Rocks, MD

Structural Engineering Software

RAM Structural System, SAFI

Steel Detailing Software

AutoCAD 2000

The following articles will appear in the First Quarter 2004 issue of AISC's Engineering Journal. **Due to production delays, this issue is expected to mail in late April. The editors apologize for the inconvenience.**

Rationale Behind and Proper Application of the Ductility Factor for Bracing Connections Subjected to Shear and Transverse Loading

Christopher M. Hewitt and William A. Thornton

Referenced in Chapter 13 of the AISC *LRFD Manual*, 3rd Edition, is a somewhat elusive stress factor for bracing connections based on research by Ralph M. Richard at the University of Arizona. The stress factor, commonly referred to as the "Richard Factor," was incorporated into bracing connection design philosophy in the Uniform Force Method to ensure ductility in the connection. The history and relevance of this ductility factor is clarified in this paper, with particular attention given to its function in the current recommendations of the manual.

Elastic and Plastic Section Moduli of Steel Angles About Principal Axes

Yongcong Ding and Murty K. S. Madugula

Steel angles frequently are subjected to bending moment due to self-weight, wind load, eccentricity of connections, etc. Depending on

the width-to-thickness ratios and unbraced length-to-width ratios, they can develop full plastic moment under transverse loads. The AISC *LRFD Manual* (3rd Edition) gives the elastic and plastic section moduli about the geometric axes (*X* and *Y* axes) only, and not about the principal axes. There is a need to calculate elastic and plastic section moduli of angle sections about the principal axes for use in determining their bending strength. Based on the simplified assumption that the cross-section consists of two rectangles (ignoring radii), formulas to locate the major and minor plastic principal axes and to determine the corresponding section moduli are derived. The results for all of the angle sections listed in the *Manual* are tabulated.

Effect of Straightening Method on the Cyclic Behavior of *k* Area in Steel Rolled Shapes

Brandon Chi and Chia-Ming Uang

Test results from a study investigating the effect of rotary-straightening on the cyclic behavior of *k* area in rolled column shapes are presented in this paper. A total of five full-scale steel moment connections were tested. The first three specimens did not use continuity plates and doubler plate; the only variable was the method of straightening of the columns (rotary-straightened, gag-straightened, and non-straightened). To increase the potential for fracture, a 1"-diameter hole was drilled in the *k*

area at the bottom-flange level of the beam. Continuity plates and a doubler plate were used for the last two specimens—one rotary-straightened column and the other non-straightened. The first three specimens all failed by fracture of the column flange outside the panel zone at large drift levels. No clear pattern indicating that rotary-straightening induced fracture was observed. Brittle fracture, initiated from the beam-web weld-access hole, occurred at 6-percent drift for the last two specimens. Although this study did not reveal adverse effects created by rotary-straightening, it is prudent to avoid welding in the *k* area.

Elastic In-Plane Stiffness for a Circular-Cut Reduced Beam Section (RBS)

Nestor R. Iwankiw and Jamshid Mohammadi

One newer moment connection that has been introduced and prequalified for use in high seismic areas is the so-called "dogbone," or reduced beam section (RBS). This paper briefly reviews the basic in-plane stiffness formulation for a prismatic beam, develops more rigorously the full non-prismatic, first-order elastic stiffness changes caused by the circular RBS, provides its simplified representation, and concludes with the general RBS stiffness-effect suggestions for design. Other RBS seismic design and performance issues of this efficient and popular detail will not be addressed, as they are already well covered in other available sources. ★

steelnews

New DXF Viewer Makes Drawings More Portable

ZiPCAD™ | View is a new DXF viewer for Palm OS Handhelds, capable of loading and viewing large technical drawings. It also has measurement tools for length and area calculations. Users can carry several scale drawings on their Palm OS Handheld, view drawings, and lift measurements right off the drawing. View also supports SD Cards (removable memory), so complete drawing archives can be carried on the handheld and accessed quickly.

"View is a response to user requests from industrial engineers, project managers, technicians, and other professionals that need to carry drawings in the field, but don't want to be burdened with large drawing sets" said Richard Coutts, President and CEO of Coutts Design Inc., the company that creates ZiPCAD software.

Coutts also is releasing the new ZiPCAD™ | Plans, a sketching application that allows users to quickly and accurately draw floor plans and other technical drawings. Architects, engineers, contractors, archeologists, geologists, designers and other professionals often need to draw field conditions. These are generally drawn by hand in the field, and then drawn again in CAD off-site. With Plans, users can CAD these drawings directly in the field and download them into their desktop CAD workstation via the DXF file format. CAD editing tools allow drawing modifications right on the handheld.

ZiPCAD™ | View is \$29.95 and ZiPCAD™ | Plans is \$49.95. All ZipCAD software can be purchased at www.zipcad.com. Additional information, including a trial version, FAQ and manual, is also available at the site. ★

Public Review of 2005 AISC Specification

The 2005 AISC *Specification for Structural Steel Buildings* is now available for public review. This specification is available for downloading on the AISC web site at www.aisc.org. Copies are also available (for a \$12 nominal charge) by calling 312.670.5411.

To submit comments, please contact Cynthia J. Duncan, Director of Specifications, at duncan@aisc.org and request a public review form. Comments must be received by April 19, 2004 for consideration. ★