AISC Offers Online Connection Seminar

AISC is offering a new online connection design seminar, so users can logon, listen and learn at their own pace and their own computer.

The seminar, "Fundamentals of Connection Design," was developed by Thomas M. Murray, P.E., Ph.D. along with AISC's continuing education staff. It was created to provide an understanding of the behavior, design philosophy and design requirements for common connections in building design projects. The seminar is practice-oriented and focuses on information engineers need to design connections or evaluate the connections shown in submittals, in both LRFD and ASD. More than 1,300 engineers attended the original seminar in 2001-2002.

Other topics include shear, moment and bracing connections, and connections for tension and compression. The seminar also features problem sets for engineers and a printable slide presentation for further study.

To access the seminar, visit www.aisc.org/onlineseminars.htm. The seminar is offered on both broadband and 56K data connections, with an introductory cost of $100 for AISC members and $150 for non-members. ★

METALCON 2003

Tampa, FL
Oct. 28-30, 2003

"Traditional, Exotic, Timeless…Designing with Specialty Metals" is the title of this year's program at the 13th annual METALCON International Conference and Exhibition. The program features a series of live-action demonstrations and educational sessions highlighting specialty metals. A special general session will focus on the sustainability of metal, and how it fits into high-performance structures and green-building initiatives. More than 8,000 designers, builders, developers and suppliers will attend, and more than 325 companies will exhibit the latest products and technology. For more information or to register, call 800.537.7765 or visit www.metalcon.com. ★

SEAOC Convention and Western States Roundup

Lake Tahoe area, CA
September 18-20, 2003

The 2003 Structural Engineers Association of California's (SEAOC) Convention and Western States Structural Engineers Association Roundup, held at the Resort at Squaw Creek, promises to be both an exciting learning opportunity and a chance to enjoy a beautiful natural setting. This is a once-a-year opportunity to participate in technical programs, learn about new products, and visit with colleagues.

"From Research …to Practice" is the theme of the technical program, which addresses research from leading universities and scholars and provides practical applications from design professionals. The Business Operations and Practice Committee will offer a session with a keynote speaker that you won't want to miss! Also, this year's trade show features more than 40 exhibitors.

For more information or to register, please call 916.965.1536 or e-mail SEAOCC@aol.com. ★

And the Winner is…

In April, 1,000 randomly selected *Modern Steel Construction* subscribers participated in *MSC*'s annual reader survey. Each completed and returned survey was entered into a raffle for a Dell Optiplex GX260D computer with a 15" monitor and Windows XP Professional.

The winner, Ethan Rhile, P.E. of Becker Structural Engineers, Inc. in Portland, ME, says the surprise win came just in time. "My computer at home is on the fritz, and I was having a lot of hard drive issues with it," he said.

Mr. Rhile works on commercial, residential and institutional projects at Becker. "A good chunk of our work is in steel," he said. "We are currently working with PDT Architects of Portland, ME on a steel-framed building for the College of Education, Health & Rehabilitation at the University of Maine at Farmington. The building is registered to be L.E.E.D. certified at the Silver Level." ★

OSA Booth *Steels* the Show

Members of the Ohio Structural Steel and Architectural Metals Association (OSA) teamed up this year to create a new booth for the Central Ohio Construction Expo—one that would *steel* the show.

"We wanted our booth to have a fresh new look to create interest and awareness of the benefits of steel and steel coatings for construction applications," said Larry Roland of Engineered Products, Inc., in Columbus, OH.

The challenge was to provide a steel structure that fit the length and width of OSA's 18'-by-6' booth space, yet was self-supporting and could be installed by hand, said Mike Hammel of AISC-member Concord Fabricators, Grove City, OH. "A mixture of lightweight structural and miscellaneous materials were used to aid in the ease of installation and tear down, while maintaining a structural look. In addition, to show the durability of steel, a combination of hot-dip galvanizing and epoxy-paint finish was used. The use of a rolled channel and the application of different finishes promoted the flexible use of steel to accommodate a variety of designs."

Columns were constructed of HSS $3\times3\times{}^{1}/_{8}$ galvanized and painted steel. Galvanized W10×12 beams and a rolled MC12×10.6 channel were used, along with laser-cut ¼" plate-galvanized lettering for the "OSA" logo. The joists were 10K1-galvanized and painted steel, while the roof deck was galvanized $1^{1}/_{2}\times22$ gauge.

"We wanted to promote our industry and the products we provide to both architects and structural engineers," he said. "The canopy accomplished this goal by providing a visual example of an 'architecturally exposed' structure, which promoted the strength, flexibility, and durability of both structural and miscellaneous steel. Just as important was our goal to promote unity within our organization and our industry for a common purpose."

"Members volunteered to provide everything we needed; including the raw materials for the newly designed booth," OSA President Gary Hammel

said. "Many hours were spent on the design, fabrication and coordination of the structural canopy."

Terry Wolfe, vice president of Columbus Galvanizing in Columbus, OH, said that the booth was impressive. "The success of our hard work and team effort is a result of our strong belief in our products and in our industry's future," he said. ★

In Memoriam

William R. Jackson

William R. Jackson, former president and chairman of the board of Pittsburgh-Des Moines Steel Company, and a former AISC Board member, died on April 29, 2003, of cancer. He was 94 years old.

In 1930, Jackson earned his B.S. in business administration and civil engineering from Massachusetts Institute of Technology before working for six years at the American Bridge Company as an industrial engineer. In 1936, he began working at the Pittsburgh-Des Moines Steel Company, which had been founded by his father. He became president of PDM in 1959, and until 1989 he served continually either as company president or chairman of the board. In 1989 he was elected Chairman Emeritus, a position he held until March 2002, when PDM was sold.

Jackson served as an AISC board member from 1962-1974. He was also a board member of the Steel Plate Fabricators Association, and served as president in 1967. ★

Correction

In the article "Steel Star" in the May issue of *Modern Steel Construction*, we failed to credit the structural engineer on the project correctly.

Uzun and Case Engineers, Atlanta, are the structural engineers for the project. Walter P. Moore, Atlanta, was a sub-consultant to Uzun and Case Engineers, as a specialty structural engineer for the atrium structure. We regret the error and any confusion it may have caused. ★

Engineering Journal Abstracts for Second Quarter 2003

Assessment of the Fire Resistance Test With Respect to Beams in Real Structures

Susan Lamont, Barbara Lane, Asif Usmani and Dougal Drysdale

The Standard fire resistance test has been used to establish fire resistance ratings of structural elements exposed to fire conditions for the last 80 years. Prescriptive fire ratings based on the results of this test are still the foundation for many fire engineering solutions. This is despite the knowledge that the fire resistance test does not represent real fire conditions. Moreover, it does not predict the behavior of a structural element as part of an integrated building, but in isolation. Failure of a beam in the fire resistance test or "runaway" is very different than the response of a beam under fire conditions in a real building. Two of the key issues highlighted during ongoing research at Edinburgh University are,

1. Large deflections as a result of thermal expansion and thermal bowing can be beneficial to the structure
2. "Runaway" does not occur in real buildings until much higher temperatures than predicted by the fire resistance test.

This paper looks in detail at the history and shortcomings of the fire resistance test and describes the difference in structural behavior of a beam in a real structure under fire attack and a solitary beam tested in a fire resistance furnace.

Experimental Investigation of Reduced Beam Section Connections by Use of Web Openings

Jong Won Park and In Kyu Hwang

A test program was conducted on seismic-resistant steel moment connections constructed using a Reduced Beam Section with web openings. In the connections, in order to enhance ductility under severe cyclic loads, a portion of the beam web near the beam-to-column connection was cut out instead of the beam flange as in dogbone connections. A total of six large-scale specimens were tested in this program. Four specimens had rectangular openings and two specimens circular openings. The beam-to-column connection had flange welds and a bolted web connection. High toughness weld metal was used for complete-joint-penetration groove welds of the flange. This test program was intended to evaluate the reliability of the Reduced Beam Section connection by use of web openings as a seismic-resistant steel moment connection. Test specimens showed good performance close to that of the dogbone connections using reduced beam flanges.

Strength of Joints that Combine Bolts and Welds

Geoffrey L. Kulak and Gilbert Y. Grondin

Welds are sometimes used to reinforce bolted joints. Design provisions for such combination joints can be found in existing specifications, but they have not been fully verified by full-scale testing. Two recent experimental studies at the University of Alberta investigated combination joints where fillet welds in different orientations were added to bolted joints at various conditions of bolt bearing. These conditions were bolts in positive bearing, bolts in negative bearing, and bolts where the bearing condition was random. The latter represents cases where neither full positive nor full negative bearing is known to be the unique starting condition. The results showed that the orientation of the welds and the bearing condition of the bolts are two key factors that must be considered when determining the extent of load sharing in combination joints. Design recommendations, formulated from experimental results, and calculation examples are presented.

Static Pullout Strength of Power Actuated Fasteners in Steel: State-of-the-Art Review

Hermann Beck, Michael Engelhardt and Neil Glaser

Power-actuated fasteners (PAFs) are small high strength nails driven into steel or concrete using powder actuated or pneumatically driven tools. When driven into steel, PAFs can be used in lieu of more conventional fastening systems such as bolts, welds or screws. This paper presents an overview of power actuated fastening for steel, and presents a state of the art review of factors affecting the static pullout capacity of PAFs in steel. Factors identified as affecting pullout capacity include fastener embedment depth, base steel thickness and strength, fastener diameter, fastener knurling, and other factors. Data is presented to describe the influence of these factors on pullout capacity.

Achieving a Stable Inelastic Seismic Response for Multi-Story Concentrically Braced Steel Frames

Robert Tremblay

When subjected to strong seismic ground motions, multi-story concentrically braced steel frames are prone to a concentration of the inelastic demand along their height, resulting in large inter-story drifts that may lead to dynamic instability. This phenomenon is mainly attributed to the poor inelastic response of the bracing members combined to the inability of the framing system to redistribute vertically the inelastic deformations in the structure. Building height limitations have been recently introduced in the CSA S16-01, *Canadian Standard for the Design of Steel Structures* (CSA, 2001) to minimize the risk of frame instability under strong ground motions. This paper briefly describes the phenomenon of dynamic instability in concentrically braced steel frames as well as the main parameters that influence this behavior. Solutions that have been developed to achieve a stable inelastic seismic response for multi-story braced steel frames are then presented and discussed.

Architecturally Exposed Structural Steel Highlights Estrella Mountain Community College Expansion Project

Expanding enrollment and developing student programs at Estrella Mountain Community College in Avondale, AZ had resulted in the need for additional administration and student-life facilities. The project incorporated new construction with a selective interior renovation to the existing one-story Komatke Hall. The expansion was designed to meet the immediate needs of the campus and create flexibility to accommodate programmatic change in the near future.

Architecturally exposed structural steel was used to accent the new addition. Using exposed steel was a way of integrating art into the functional aspect of Estrella's all-block campus architecture. Structural steel created a non-imposing medium to highlight the block structures. "Steel brings down the scale of the high, monolithic block buildings," said Project Architect Chris Ledwith, of SmithGroup. "Steel was used ornately, with canopies and trellises, to help to bring a more human scale to the project."

The highlights in structural steel create a space that has an inviting element and gives life via the interplay of light, shade and breeze. The variety of steel sizes and shapes brings together diverse elements of the architecture in various locations, and meets the requirements of angles and curves in the building's floor plan.

"The structure was more than just a simple box—it was curvilinear, and steel gave us the flexibility we needed," said Project Manager Carl Price, also of SmithGroup.

Steel was also economical and could be erected swiftly. "The steel could be done in a short time frame–it required less forming than with concrete, was readily available, and was a less expensive product," Ledwith said.

A butterfly trellis, which functions as an entry sequence and student gathering space has become a new point of interest on campus. It is not a solid canopy, and so provides a mix of breeze, light and shade, which accommodates the Arizona climate. It has an inside/outside feel that ties together two buildings and reaches into the courtyard. High-strength steel members combined with 4" steel grating create a lacy and light appearance. What could have been a simple canopy became a sculptural/functional piece of art with the use of steel.

A doubled-curved trellis deals very well with the complex geometry of the new building. The flexibility of steel allowed adaptability to the curved shape of the building.

Steel eyebrows/steel columns facilitated large, open expanses of glass that would not have been suitable with a traditional masonry building. Steel creates a non-intrusive sense of sharing the indoor and outdoor spaces.

Lastly, the south-entry steel canopy was an elegant and simple solution. Exposed steel was suitable alongside rough masonry, and allowed the designer to work creatively within the existing campus vernacular. ★

ESTRELLA MOUNTAIN COMMUNITY COLLEGE
Komatke Hall Expansion & Remodel
Avondale, AZ

ARCHITECT
SmithGroup, Phoenix

STRUCTURAL ENGINEER
Parragon Structural Design, Inc., Phoenix