National Student Steel Bridge Competition 2004

The 2004 ASCE/AISC National Student Steel Bridge Competition (NSSBC) will be held on May 28-29, 2004 at the Colorado School of Mines in Golden, CO. NSSBC is an opportunity for college students from around the nation to compete to design and build efficient bridges. Students are judged on aesthetics, speed of assembly, and efficiency (i.e. minimum deflections under loaded conditions). The competition continually attracts the best and the brightest civil engineering students.

For the first time this year, the competition will feature an outreach program for students in middle school and high school, to give them the chance to attend this national collegiate competition and watch the teams build their bridges. Also new this year is an opportunity to help college students network with future employers–each competing student will provide a resume that will be given to participating companies.

If you or your company would like to help fund NSSBC this year, please contact Candy Ammerman at 303.273.3662, or cammerma@mines.edu. Sponsors for NSSBC are the American Institute of Steel Construction (AISC), American Society of Civil Engineers (ASCE), American Iron and Steel Institute (AISI), National Steel Bridge Alliance (NSBA), The James F. Lincoln Welding Foundation and Nucor Corporation. ★

Enter the 2004 AGA Hot-Dip Galvanizing Awards

The American Galvanizers Association (AGA) is now accepting applications for its 2004 Excellence in Hot-Dip Galvanizing Awards. Presented annually, these awards recognize projects that use hot-dip galvanizing in an ideal, creative, innovative, or monumental fashion. Awards categories include: artistic, bridge and highway, building and architecture, civic contribution, coatings over hot-dip galvanizing, electrical utility and communication, food and agriculture, industrial, international, original equipment manufacturing, recreation and entertainment, and water and marine.

Winning projects will be announced at the AGA's annual conference awards dinner on Wednesday, March 24, 2004 at the Hyatt Regency in La Jolla, CA. For each award presented, the galvanizer and all parties involved with the project will receive recognition. Winners will receive a four-color project brochure, an award plaque, and will be featured on the AGA web site and in various seminars, editorials, and publications. Non-winning projects could be publicized as well. All submissions will be considered for the 2004 Most Distinguished Project of the Year.

While membership is not required to enter, projects submitted must have been galvanized by an AGA-member galvanizer, and construction must have been completed during 2003. This free competition is open to all architects, engineers, fabricators, and other members of the specifying community. For project guidelines, rules and applications, contact the AGA at 720.554.0900, or msterling@galvanizeit.org. Application forms also can be downloaded at **www.galvanizeit.org/awards**. All entries must be received or postmarked on or before Friday, Jan. 23, 2004, with no extensions. ★

Orthotropic Steel Bridge Conference

Sacramento, CA
August 2004

ASCE and NSBA invite you to attend the Orthotropic Steel Bridge Conference in Sacramento, CA in August 2004. The technical six-day program will include a one-day tour of orthotropic steel bridges in Northern California. As part of the conference, a two-day "Advanced Topics on Orthotropic Bridges" class will be offered. Price is $800 for ASCE/AISC/NSBA Members and $1000 for non-members. Also offered is a two-day "Introduction to Orthotropic Bridges" class. Price: $300 for ASCE/AISC/NSBA Members and $500 non-members. ASCE College Student price is just $150.

ASCE and NSBA also invite submissions for case-study presentations at the conference. There are seven technical categories: design, construction, fabrication, wearing surfaces, bridge maintenance, research, and materials/high performance steel.

For readers of *Modern Steel Construction*, the abstract deadline is on or before Feb. 15, 2003. Abstracts must be one page. If submitting electronically, please use MS Word or Adobe Acrobat Reader and limit files to under 1.5 MB. Please indicate the category and provide contact data: phone, fax, postal address, e-mail and employer.

Guidelines for the written paper are available at **www.asce.org**. Conference papers will be selected by Feb. 28, 2004, and authors must agree to attend and pay registration fees by March 28, 2004.

For more information, visit **www.orthotropic-bridge.org**. ★

Call for Entries: AISC's 2004 E.A.E. and I.D.E.A.S Awards

AISC announces a call for entries for its 2004 **Engineering Awards of Excellence (E.A.E.)**. The awards recognize innovation in steel-framed building projects. To qualify, a significant part of a structure's framing system must be steel wide-flange structural shapes or hollow structural sections. Projects must be located in the United States, Canada or Mexico. Entries must be received by Feb. 13, 2004.

AISC also announces its 2004 **Innovative Design and Excellence in Architecture with Steel (I.D.E.A.S.)** awards. The awards recognize designs where structural steel forms a prominent architectural feature of a building. Buildings must be designed by architects licensed in the United States or be located in the United States. I.D.E.A.S. entry fees are due March 15, 2004 and submissions must be postmarked by April 15, 2004.

For both competitions, projects must have been completed between Jan. 1, 2001 and Dec. 31, 2003.

Both new buildings and renovation projects are eligible. Firms can submit multiple projects. Winners will be featured in *Modern Steel Construction*. For more information, visit:

www.aisc.org/awardsEAE
www.aisc.org/awardsIDEAS

or contact Becky LeDonne, 312.670.5433 or e-mail ledonne@aisc.org. ★

2003 World Steel Bridge Symposium Wrap-Up

The 2003 World Steel Bridge Symposium drew a mix of bridge designers, state DOTs, fabricators and bridge industry experts to the Hyatt Grand Cypress Resort in Orlando in November to discuss what's new in steel bridge design and construction. Participants and presenters traveled from around the globe to share recent experiences, innovative ideas and future technology for steel bridges. The National Steel Bridge Alliance (NSBA) and the Federal Highway Administration (FHWA) sponsored the symposium, and technical sessions covered everything from fast-track projects and creative architecture to bridge replacement and railway structures.

Florida Transportation Commissioner C. David Brown II opened the symposium with a keynote address, and discussed the federal and state funding challenges facing the bridge industry. "The breadth of the transportation industry is huge, and its power is tremendous," he said. "But sometimes it is fragmented. All the stakeholders should join and work together to ensure federal funding."

Popular lectures included case studies on topics like steel tub-girder design, load-deflection criteria, unique bridges, and bridge-construction contract language. Walter Gatti of Tensor Engineering and Bill Eliot of Kiewit Pacific discussed the design and construction of the near-complete, $23.3-million Turtle Bay Sundial Bridge in Redding, CA. The 720'-long pedestrian bridge, designed by architect Santiago Calatrava, features an asymmetrical, cable-stayed "sundial" in its superstructure. Robert Stanley, of DMJM + Harris presented the M. Harvey Taylor Bridge rehabilitation project, which required the re-docking of a 4220' highway bridge while maintaining traffic in four lanes. Rick Engel of E.L. Robinson presented the fast-track, 47-day replacement of a steel bridge on Ohio SR22. Mike Laviolette of HNTB described the erection of the U.S. 20 Iowa River Bridge, the first incrementally launched steel I-girder highway bridge in the United States.

The possible introduction of Trans Rapid Maglev high-speed trains in the United States was another topic featured at the symposium. The Maglev trains can travel up to 300 mph on their guideways, which use a magnetic levitation system to suspend the train and a linear electric-motor propulsion system to drive it.

"The steel industry's role will be to provide the guide way," said Wendall Hirschfeld, of AISC-member Hirschfeld Steel. "There are numerous contractors planning to build the first demo project from Anaheim, CA to Las Vegas. Steel will be the most cost-effective and easy-to-build solution."

Another topic discussed was electroslag welding. "Electroslag welding replaces arc welding, and cuts time to weld by a third," said Larry Durain, of D.S. Brown. "It reduces costs to owners while increasing quality. We believe it will make steel more competitive as a whole and give the steel industry an edge. It eliminates time and labor costs."

Mammoet, a company that specializes in heavy lifting, presented their computerized lifting systems, which can lift bridges in complete spans and place them in one piece. "We raised the Russian submarine, the Kursk, from under the Barents Sea, and we raised the Millennium Wheel in London," said Bill Halsband, Mammoet vice president of North American Business Development. "Our system is good for bridges over high traffic areas, and saves congestion, detours, lane closures, time and a lot of aggravation."

Many participants also attended pre-symposium workshops: AASHTO Specifications for Bridge Design, Curved and Skewed Girder Design and Construction, Short Span Bridges, and the FHWA High Performance Steel Workshop. "The session on curved and skewed bridges was excellent," said J.B. McCarthy of the Vermont Agency of Transportation. "It was a lively open-panel discussion with designers, fabricators, and detailers exchanging ideas and sharing common problems."

Another highlight of the symposium was the exhibit hall, where vendors offered information on bridge deck systems, dampers, software, coatings, erection systems, inspections services, and more. One popular vendor was Ropelink, a company that uses mountaineering cable techniques to perform inspections, maintenance and repairs in difficult-access locations. "We use advanced climbing techniques–it's not window washing," said Hamid Vossoughi, P.E., Ropelink U.S. operations director. "Instead of having lane closures and interruptions, we get in and get out quickly, with minimal impact to the structure."

On the second day of the symposium, NSBA presented the 2003 Prize Bridge Competition Awards at a dinner banquet. In addition, Walter Gatti was presented with AISC's Special Achievement Award for his work on the timely repair and replacement of the Webbers Fall Bridge near Oklahoma City. Arun Shirole, former president of NSBA, was presented with a Special Citation Award for his service to the alliance.

The symposium was met with enthusiasm from attendees and participants, who say they look forward to the next one. "Being here gives you a sense of lessons learned–in design, construction and fabrication," said Roderick Lewis of the New Jersey DOT. "You learn what to get into and what to avoid. Sometimes you don't know how good your design is until you build it. The value of these sessions is that you see and learn about built bridges–and the proof is in the pudding." ★

Larry Durain of D.S. Brown discusses the benefits of electroslag welding vs. arc welding in the exhibit hall.

Walter J. Gatti, president of Tensor Engineering, receives AISC's Special Achievement Award. From the left: AISC President H. Louis Gurthet; Gatti; NSBA Executive Director Conn Abnee; and NSBA Executive Council Chairman John Grzybowski.

Rail Bridge Replaced in Nine Days with Steel

On Sunday, June 22, 2003, a fire destroyed a 260'-long timber and steel trestle bridge in Riverdale, IL, that carried the track for one of Chicago's Metra rail commuter trains, a major artery in the city's transportation system. The bridge's absence would impact thousands of daily commuters who ride Metra's Electric District Line. Using structural steel to construct a temporary bridge, Metra worked with Chicago-based Alfred Benesch & Company (engineer), and Kiewit Western Company (general contractor) to assess existing conditions, develop a design-build plan and execute the reconstruction of the train line. Planning and design of a temporary structure began immediately and proceeded concurrently with the removal of the remains of the destroyed double-track bridge. Due to the team's careful coordination and planning, full commuter service was restored on Tuesday, July 1, just nine days after the fire.

Eight days to Service

Kiewit Western went to the site immediately, to clear and remove debris. Benesch sent a survey crew to establish elevations and locations for the temporary construction. Rolled beams for the temporary bridge replacement spans were available on the East Coast, so Kiewit coordinated shipment to Chicago and handled the acquisition of steel piling.

Benesch prepared a temporary design based on available material and the contractors' input on fabrication and construction methodology. Metra reviewed the options and directed the design team to proceed.

Getting to work

The original bridge was a multi-span structure with two steel spans interspersed among timber trestle approach spans. The substructure consisted primarily of timber pile bents with the exception of the concrete south abutment.

In 2001, Benesch had completed a design for a permanent replacement structure, consisting of two through plate girder spans supported on concrete abutments. Kiewit had been awarded the contract and was constructing the new bridge when the fire took place.

The common foundation footing for new Abutments 2 and 3 as well as the footing for Abutment 1 already had been built, and the new bridge was scheduled for completion by December 2003. Confronted with the fire damage, the team decided to construct a temporary four-span steel bridge using the new concrete foundations.

Kiewit began driving sheet piling for a new north approach. Benesch surveyors established the controls. The design team ran calculations for the steel components. Fabrication of the bents and spans was already in progress, working directly from the designers' sketches.

North Approach

Prior to the fire, the north approach trestle was to be replaced with a retained fill system of tied-back steel sheet-pile walls running parallel to the tracks and northward from the end of new Abutment 1. The sheet-pile walls were designed to retain a controlled low-strength-material (CLSM) fill to support the tracks, and were partially completed when the fire occurred.

For the temporary bridge, a line of steel sheeting was driven along the face of the new footing to serve as a temporary back wall at the north end of the temporary beam span.

The design of the sheet-pile retaining walls running parallel with the tracks was modified for a more conventional fill. Instead of the CLSM, a CA-7 grade fill material was chosen for its self-compacting characteristics and ease of placement. The sheeting system was redesigned using dywidag bars sheathed in plastic tubing.

The re-design and detailing of the sheeting system began on Monday and was completed on Wednesday. Minor adjustments were made as work progressed, and by Friday, the driving of the sheet piles was complete.

Substructure

The substructure for the temporary bridge consists of prefabricated steel tower bents with HP14 x 89 tower legs and channel sections bolted to the top of each line of piling. Each bent is braced with a double row of welded x-bracing.

At Abutment 1, the temporary bent is supported on the new permanent concrete footing. The temporary bent has a single row of piles and is tied to the sheet-pile wall for stability in the direction of the track. At Abutment 2 the bent is landed on the new permanent common footing that supports Abutments 2 and 3. The concrete stem for Abutment 3 was poured prior to the fire, and although it was damaged slightly, it could be used to support the ends of spans 2 and 3.

Throughout the week, Benesch surveyors worked closely with Kiewit personnel and the design team to lay out the bent locations for the temporary structure. The initial bent details were developed on Monday and finalized on Wednesday, with shop fabrication proceeding simultaneously with design and detailing. Shipment of the bents to the job site began on Thursday. All temporary bents were erected by late Friday afternoon.

Superstructure

One of the first concerns was the configuration of the temporary spans. The project team needed to avoid the locations of the substructure elements for the permanent bridge that had not been built, and also use the permanent substructure that already was constructed. The longest span had to be less than 50' in length to meet site requirements and allow the use of rolled beams.

Kiewit located W36x300 beams on Tuesday. They were shipped to Chicago by Thursday. The spans were assembled fully in the fabrication yard in sets of four beams, complete with bearing stiffeners and diaphragms. The ends of the spans were skewed to match the existing substructure.

The bearings consisted of steel flat plates and steel shims that were field-installed to adjust for elevation. At the south end, a short jump span, consisting of W14x90 rolled beams, was used to span between the southerly tower bent and the existing south abutment.

Bridging the Gap

By late Tuesday the initial design work for the superstructure was complete. Coordination between engineer and contractor was ongoing to ensure the span fit-up at the site.

The first span was delivered to the site on Saturday morning and the erection of the remaining spans on the temporary bents was completed on Sunday. The spans were set with deck ties already in place. Metra laid track over the temporary bridge immediately following the completion of the span installation. On Monday the tie-down of the spans to the bents was completed.

We're Back

The first test train rolled over the completed temporary bridge on Monday, June 30, just 8 days after the fire itself. By Tuesday, July 1, normal service was resumed.

Steel's availability and speed of delivery and erection meant that the temporary bridge could be constructed quickly and efficiently. This, in combination with the team's quick response, communication and coordination in the face of a crisis, allowed the Riverdale bridge to rise from the ashes. ★

—article contributed by Alfred Benesch & Company

Photos Courtesy Ron Soderquist

A part of the temporary bridge is lifted into place

The train is up and running, just nine days after the fire.