Multi-Story Residential Opporunities Heat Up

Interest in steel-framing systems for multi-story residential structures is on the rise, report AISC's Steel Solutions Center and AISC Regional Engineers. Recent articles on the staggered truss system and the publication of Design Guide 14 is partly responsible for generating so much attention. *MSC*'s "Anatomy of a Staggered Truss" insert in the September issue also has sparked interest, along with the Staggered Truss Breakfast Seminars taking place across the country (the next one is in Chicago on December 10).

Many fabricators are working to identify projects designed in concrete, contact their owners, and suggest a steel alternative. The Solutions Center has worked on a confidential basis with these fabricators in developing conceptual solutions for presentation to their potential clients.

You can take advantage of this growing momentum:

- Attend the next "Multi-Story Residential Workshop" to be held in Chicago on December 9 and 10, and learn more about the multi-story residential marketplace, applicable systems and effective methods of promoting steel as an alternative to concrete;
- Request copies of AISC Marketing's materials about the multi-story residential marketplace to distribute to your clients and contacts;
- Pass on copies of the "Anatomy of a Staggered Truss" to your favorite structural engineers (several universities have requested copies for their structural engineering and architecture students); and
- Stay alert for new hotels, condominiums, dormitories, apartments and senior residences planned for your area. Contact owners, developers and architects to discuss steel alternatives

For more information on the seminar or for material you can share with your potential clients, contact Becky LeDonne at 312.670.5433 or by e-mail at ledonne@aisc.org.

AISC Extras

"Anatomy of a Staggered Truss" Drawing

Copies of the "Anatomy of a Staggered Truss" drawing that appeared as an insert in the September issue of *Modern Steel Construction* are available free of charge through the Steel Solutions Center at:

866.ASK.AISC
or via e-mail at
solutions@aisc.org

AISC Top 10 Lists Online

A new feature of the AISC web site is a collection of Top 10 lists pertaining to steel construction. For the inaugural list, Charles J. Carter, S.E., P.E. (Chief Structural Engineer at AISC) has chosen his "Top 10 Gurus of Steel Design and Construction." Learn more about these world-famous engineers—and post your own list of favorites—online at www.aisc.org. Keep watching for more Top 10 lists!

Oakley Steel Products Offers Unique Discount to World Trade Center Site Rebuilders

Oakley Steel Products, of Bellwood, IL, one of the largest and most diversified custom steel rolling, shaping and bending companies in the Midwest, announces a unique incentive to all organizations that eventually become involved in the rebuilding of the World Trade Center site. The company will provide a 10% discount on rolling, shaping and bending of steel that is specifically destined for the site.

Oakley, which forms steel ranging from small structural sections to some of the largest sections produced, and from sheet metal to six-inch thick plate, will apply the discount to its rolled, bent or shaped steel orders placed by fabricators, builders, contractors, architects or other purchasers of site-specific construction materials. The company, which has begun many long-term customer relationships by offering similar discounts on a one-time basis to first-time buyers, will offer this special discount to new and current customers alike.

"Rolled, shaped and formed steel, in a multitude of configurations and uses, will play a vital role in the rebuilding of the World Trade Center site," says Ed Libby, president of Oakley Steel Products. "Our company was proud to be part of the original building, and we very much want to be a part of this historically significant rebuilding. This program is our way of encouraging all those involved to consider Oakley their partners in construction."

Oakley Steel Products has specialized in all aspects of custom rolling, shaping and bending of steel, stainless and aluminum for more than 80 years. Using state-of-the-art equipment, the company is able to provide the highest-grade, guaranteed-quality products at the most advantageous cost. Special capabilities include spiral staircase stringers made from tubes, channels or plates; curved rectangular tubes, beams and bars - the easy way or hard way; pipes, cylinders, cones, formed plates and more. Oakley's extensive transportation fleet facilitates cost-effective, on-time delivery throughout the United States, Canada and Mexico. For additional information, visit www.oakleysteel.com.

Correction

The project team information was omitted from the article "Aesthetic Appeal" in the September 2002 issue of *Modern Steel Construction*. The project was fabricated and detailed by AISC-member Egger Steel Company of Sioux Falls, SD. We regret the omission. A corrected version the article is available at www.modernsteel.com.

Special Delivery

Beth Pollak

The installation of a footbridge at the Detroit Medical Center went smoothly and quickly—thanks to the design-build team that planned it.

The team designed a steel walkway between the hospital's infant delivery room and neonatal intensive care unit to allow quick access between the facilities during emergencies. The installation of a single, 93-ft-long span was accomplished by an hour-long "blind pick" over an eight-story building.

The complex shape of the buildings surrounding the proposed bridge location and the needs of the patients inside forced the design-build team to come up with a careful erection plan.

"Originally the structural engineer had designed the framework to be set in a multitude of pieces," said Robert Skinner of Turner Construction Company. "Instead we chose to fabricate the entire bridge in the shop as one truss. It was lighter, and as a result it could span further. The truss design also made it possible to erect it in one lift."

The lighter design also meant that only two column supports would need to be installed beneath the walkway, said architect Thomas Gunn, of Gunn Levine in Detroit, MI. The supports were punched through two lower levels of the building, and additional supports could have caused more disruption. Both ends of the bridge ends cantilever over the columns.

The project team had to balance time and spatial constraints with the needs of hospital patients as they determined exactly how to install the truss.

"We had to think—how do you pick from the front of the hospital, which is over 120 ft to where the bridge would be located?" Gunn said. "It would have required a monster erector set, and would have gone over areas of the hospital that included surgical rooms and the pharmacy. Performing a single, blind pick over an in-patient unit, where the patients could be relocated on a Sunday, involved less risk."

The blind pick also was more cost-efficient.

"Coming from the front of the hospital would have taken a 600-ton Demag crawler, which is expensive for a one-day pick, because it takes 10 days to set up," said Steve Bean, senior project manager of Detroit-based Ideal Steel. "Instead, we used a 300-ton hydraulic crane to set up the pick—and finished the job in a weekend."

Bean says workers placed the columns on a Saturday and picked the 12-ton truss on a Sunday. During the week that followed, they added the tail section of the bridge, performed detailing work, and placed a concrete floor inside.

"With a pick like this, you always worry that it's not going to fit—and there will be a lot of detail work—but this was a nice project," Bean said.

The project team also worked together to address safety issues. Because the pick was performed from the back of the building and over the top, erectors could not see where they were picking the truss. Ironworkers were placed on the roof of the building and guided workers on the ground through radio contact.

"We had an evacuation scheme," Bean said. "We evacuated the first three floors. If something were to fall, it could go through the first and second layers of the building. And with the shoring going down through the cafeteria, it also needed to be evacuated, which is why we chose the weekend, when few people would be there."

Since the bridge's erection in July, a glass enclosure and other finishes have been added. The entire project took only four months to complete.

Skinner says design-build is what helped the team save so much time and money.

"It's because the lift and the design were done in concert with each other on this job. Instead of just designing it and saying, 'you guys should figure it out,' we worked together—any other way it wouldn't have worked out."

The new pedestrian bridge was lifted in one piece over a hospital wing and into an interior courtyard in a carefully-orchestrated blind pick procedure.

Peddinghaus Announces Training Classes for Steel Fabricators

Peddinghaus Corporation announces a new series of training classes for members of the structural steel and heavy plate fabrication industries. Peddinghaus has developed a series of classes to improve shop-level operation training in the following areas:

- Operation, maintenance, and programming of drilling machines for structural steel fabrication
- Maintenance, operation, and nesting programming of heavy plate and flat stock for plasma/oxy-fuel punching and drilling machine tools
- Anglemaster operation, maintenance, and programming for automated angle/flat processing systems
- Oxy-fuel cutting systems for structural sections – program and operation training

The classes are held on a bi-monthly basis at Peddinghaus' manufacturing facilities in Bradley, IL and Andrews, SC. By combining both classroom and "hands-on" training, information retention is enhanced for each trainee. Full documentation is provided.

For further information on this innovative new program for the structural steel fabrication industry, contact todd-cordes@peddinghaus.com.

Steel Solutions Center Goes Toll-Free

Your connection to ideas and answers is now just a TOLL-FREE call away! Designers, fabricators and others in need of technical assistance can contact the AISC Steel Solutions Center at its new TOLL-FREE number: 866.ASK.AISC (866.275.2472). AISC experts also can provide conceptual solutions to answer your questions about design, cost and schedule. You can still reach the Steel Solutions Center by e-mailing solutions@aisc.org.

Steel SolutionsCenter

The New SSPC-VIS 1

The society for protective coatings has released its new guide with reference photographs for steel surfaces prepared by dry abrasive blast cleaning.

SSPC's new version of its visual reference has new photographs of previously painted blast-cleaned steel, industrial blast (SP 14) surfaces, a revised and expanded guide and more. It features a series of full-color reference photographs depicting steel surfaces prepared in accordance with the SSPC/NACE standards for white metal (SP 5), near white (SP 10), commercial (SP 6), industrial (SP 14), and brush-off (SP 7) blast cleaning. It also contains photographs illustrating acceptable variations in white metal surfaces caused by different metallic and non-metallic abrasives, surface profile depth, angle of view, and differences in lightning.

The price is $115.50 for SSPC members and $165.00 for non-members. Order by calling 877.281.7772 or by visiting www.sspc.org/books.html.

Structural Steel Research Publication Available

The *Journal of Constructional Steel Research* (JCSR) recently published an issue focusing on structural steel research in North America. Edited by Reidar Bjorhovde and issued as Volume 58, Nos. 5-8, the 666 page book presents 27 papers by major American and Canadian steel researchers and practicing engineers.

Some contributions focus on issues related to earthquake performance of steel structures, elements and connections. Others deal with state-of-the-art subjects on composite construction, bridges, high performance steel and advanced modeling of structures and components. Connections also feature in the journal, including topics such as strength, stiffness and ductility of various moment connections, crack propagation in welded panels, single plate shear tabs and gusset plates.

The *JCSR Special Issue on North American Steel Research* is available for sale for US $75. Customers in the US and Canada can place an order by calling 888.437.4636.

For more details, contact the JCSR North American editor, Reidar Bjorhovde at rbj@bjorhovde.com.

Send press releases and other information for the *Steel News and Events* section to Keith Grubb via e-mail at grubb@modernsteel.com.

Undergraduate Students Build Steel Bridge

During the spring of 2002, undergraduate civil engineering students in the advanced structural analysis class at Case Western Reserve University designed, fabricated and built a 14 m (46′) pedestrian bridge at Squire Valleevue Farm, a University research and recreational facility in Hunting Valley, OH. The bridge is a Howe-Stone truss. It uses 3″-thick steel HSS for the diagonals and $^{5}/_{8}$″ Dywidag bars for the vertical elements and the chords. The truss was prestressed by tensioning the vertical elements. The prestressing precludes compressive forces in the top chords and tensile forces in the diagonals under a full gravity live load condition. Therefore, it was possible to use Dywidag bars for the top chord and simple bearing connections, without bolting or welding, for the diagonals.

The bridge was designed at the request of the Ana Locci, Farm Director. Dario Gasparini,Professor of Civil Engineering, and Neil Harnar, Department Engineer, supervised the activity.

Engineering Journal Abstracts for Third Quarter 2002

Ultimate Strength Prying Models for Bolted T-stub Connections

by James Swanson

Several recognized prying models are discussed and evaluated using experimental data collected during 21 component tests conducted as part of a SAC investigation at the Georgia Institute of Technology as a basis. Four existing prying models are considered in addition to the model that appears in the European design specification. A modification of an existing design model is proposed.

Influence of Bolt-Line Eccentricity on WT Tension Member Capacity

by Karl Barth, James Orbison, and Peter Bartels

This paper focuses on the influence of connection eccentricity (as defined by the perpendicular distance between the bolt-gage line and the elastic neutral axis) on the capacity of WT sections designed as tension members. A series of eight Grade 50, WT6x7 short tension member specimens (specimens were 36 in. in length) were tested to determine their ultimate load capacity. The experimental tests were performed by loading the specimens through the stem in direct tension. The WTs were fabricated with varying edge distances (4 total nominal edge distances) and with both punched and drilled holes. The experimental failure loads are compared with the design resistance predicted by the AISC Load and Resistance Factor Design Specification for Structural Steel Buildings, hereinafter referred to as "the specification" (AISC, 1993). It is shown that sections with small eccentricities perform reasonably well when compared with predicted resistance. However, as the eccentricity is increased, the specification is unconservative in predicting the failure load.

Composite Steel Joists

by David Samuelson

This paper focuses on the advantages associated with composite open web steel joists, development and testing of open web steel joists, behavior of welded shear studs observed while testing composite joists, case histories of projects using composite joists, unique vibration considerations associated with joist floors, and current status of composite joist specification development.

The Effect of Bedding Layer on the Strength of Shear connection in Full-Depth Precast Deck

by Jong-Hee Kim, Chang-Su Shim, Shigeyuki Matsui and Sung-Pil Chang

Shear connection in a steel-concrete composite bridge with a full-depth precast deck is characterized by the material properties of the non-shrink mortar, which is the filler in the pockets for the shear connectors, and the existence of a bedding layer between the precast deck and the steel girder. As a consequence, the behavior of the shear connection is very different from that of the more widely used cast-in-place concrete deck. Experiments on push test specimens with several parameters varied were performed to evaluate the ultimate strength of the shear connection in the precast deck. Based on the test results, an empirical equation for the ultimate strength of the shear connection considering the effect of the bedding layer thickness is presented and recommendations for the design of the stud shear connection in a full-depth precast deck are suggested.

Dynamic Amplitude Prediction for Ballroom Floors

by Linda Hanagan

To avoid excessive vibration in ballroom-type floors, engineers can evaluate a floor system design before construction using the procedures outlined in the AISC Design Guide 11. These procedures are most appropriately applied to simply-supported beam systems where dancing is expected to occur over the entire span. This paper presents a modification to assess beam/girder systems subjected to dance type loads over only a portion of the bay. This modification is especially useful for long-span systems where meeting the serviceability requirements is difficult.

P-V-M Interaction Curves for Seismic Design of Steel Column Base Connections

by Jaswant Arlekar and C.V.R. Murty

Recent studies on connections have shown that the beam bending theory cannot predict the flow of forces near the connection regions. In this paper, a new truss analogy model has been proposed to better represent the flow of forces near the column base connections. Also, shear-moment strength envelopes, generated for different levels of axial load using the hysteretic stress-strain curves for steel, are presented. The moment and shear demand for the design of column base connection elements are calculated using the normalized P-V-M interaction curves. Appropriate strength factors applied to the moment capacity of the column section to account for the uncertainty in the estimation of yield stress, strain hardening, compactness of the section, and slenderness of the member are discussed. Finally, a generalized procedure for the capacity design of column base connections is proposed.