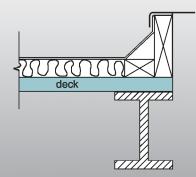




S D D S N 3 6 E G D A



What is the crushing capacity of roof deck that is sandwiched between a load and a support?

This is defined as the "Two Flange End Loading Web Crippling Capacity" when the load is near the end of a deck sheet.

Allowable Two Flange End Loading for Fastened Deck PLF											
Deck Type	В				F			N			
Bearing Width	22	20	18	16	22	20	18	22	20	18	16
3	675	1015	1805	2890	665	1000	1780	435	670	1230	2000
3.5	705	1060	1880	3005	695	1040	1855	460	700	1280	2080
4	715	1070	1895	3015	710	1060	1875	475	730	1330	2155
4.5	715	1070	1895	3015	710	1060	1875	495	755	1375	2225
5	715	1070	1895	3015	710	1060	1875	510	780	1415	2290
5.5	715	1070	1895	3015	710	1060	1875	530	805	1455	2355
6	715	1070	1895	3015	710	1060	1875	545	830	1495	2415

- Choose the lesser bearing width of the load or support to determine the capacity. Two Flange End Loading" applies when the end of the deck extends less than 1.5 times the deck depth beyond the edge of the beam or load point.
- The above table is based on the method that will appear in the next edition of the AISI Specification—not the method in the 1996 Edition or the 2000 Supplement.

For further information on any of our products or for the nearest CMC Joist & Deck sales representative, contact us at:

> CMC Joist & Deck Summit, NJ 07901 25 DeForest Avenue 1.800.631.1215 www.cmcjd.com

CMC Joist & Deck - Divisional Office 440 Knox Abbott Drive Suite 250 Cayce, SC 29033

CMC Americas 6565 N. MacArthur Blvd., Suite 800 Irving, TX 75039











# Tekla Structures 14

# Explore.

- Multi-user management tools
- Support for industry workflowTask-oriented user interface
- Flexible licensing system
- Interfaces to other software
- Wider integration to manufacturing



How would you like to increase the productivity of your office and your team members? Tekla Structures 14 offers a more intuitive and logical task-oriented user interface, a new flexible licensing system, better multi-user management tools, as well as more intelligent interfaces to other software and production machinery to support your industry workflow. Explore the new Tekla Structures 14 and learn how you can increase your productivity.

SEE TEKLA AT NASCC April 2-5 NASHVILLE, TN Booth 713

CONTACT TEKLA INC. (Toll-free 1-877-TEKLA-OK) info.us@tekla.com





# **March 2008**



# departments 6 EDITOR'S NOTE

- STEEL INTERCHANGE
- STEEL QUIZ
- **NEWS & EVENTS**
- **LETTERS**

### resources

- NASCC EXHIBITORS
- 111 MARKETPLACE
- 112 EMPLOYMENT

# discussion

# 20 Reaching for the Stars

BY SCOTT MELNICK

Contemporary architectural press covers architects with great fanfare—but where are the "Star-Engineers"?

### bridges

# 42 Meandering Across the Missouri

BY CHRISTIAN BROWN, P.E.

The right material and the right design were the keys to success for a new Missouri River pedestrian bridge.

# health-care facilities

# 47 Campus Core

BY JIM CORSIGLIA, P.E., S.E.

A new cardiovascular facility is the heart of the University of Michigan's medical campus.

## economical design

# 55 Save More Money

BY CHARLES J. CARTER, P.E., S.E., AND THOMAS J. SCHLAFLY

Smart design and detailing can add up to big savings in the total cost of fabricated structural steel.

### hss developments

# **65** Going Elliptical

BY JEFFREY A. PACKER, PH.D., P.ENG. Elliptical hollow sections are becoming more popular in North America.

# how it's done

# **68** A Complete Fabrication

BY GEOFF WEISENBERGER An AISC Certified steel fabricator gives us an inside look at its processes.

# quality corner

# 77 Empowering Improvement in the **Supply Chain**

BY LARRY MARTOF

Correcting weak links in your supply chain will help ensure a smooth delivery process—and satisfied customers.

### business issues

# 83 Don't Send your Top Talent Off the Tracks

BY TIM TOKARCZYK, WILLIE HEPWORTH, AND VANESSA WINZENBURG

Is your company doing all it can to prevent career derailments?

## shop and field issues

# 89 Special Treatment

BY TOM SCHLAFLY When it comes to fabrication, design, and

welding of steel shapes, working with HSS is a whole other ball of wax.

### people to know

# 93 The Progression of the Structural **Engineer**

BY ERIK NELSON, P.E., S.E. What is truth? An experienced structural engineer found that when it comes to

# design, truth changes over time. topping out

# 114 Emerging Roles in Structural BIM

BY MICHAEL GUSTAFSON, P.E.

As BIM reaches critical awareness, two new BIM roles look poised to go mainstream.

# **NASCC: The Steel Conference**

# 27 Going Beyond Material Issues

BY MARK GORGOLEWSKI, PH.D., DIP. ARCH.,

Steel's high ratio of recycled content isn't its only asset in the sustainability game.

# **High Seismic Detailing and Fabricating**

BY TOM FERRELL AND TONY HAZEL Here's an introduction to some of the complexities of detailing and fabricating "high seismic" projects.

# Nashville, April 2-5, 2008

# 35 Quality Assurance for Structural **Engineering Firms**

BY CLIFFORD SCHWINGER Implementing an in-house quality assurance program benefits your firm, your employees, and your clients.

# 39 Roof Diaphragms and Low-Rise Seismic Design

BY COLIN A. ROGERS AND ROBERT TREMBLAY More robust roof diaphragm designs may be required in high-seismic areas.

ON THE COVER: Fabricated members are stacked in the yard at Cives Steel's Wolcott, Ind. plant. Photo by Jessica Sladek.

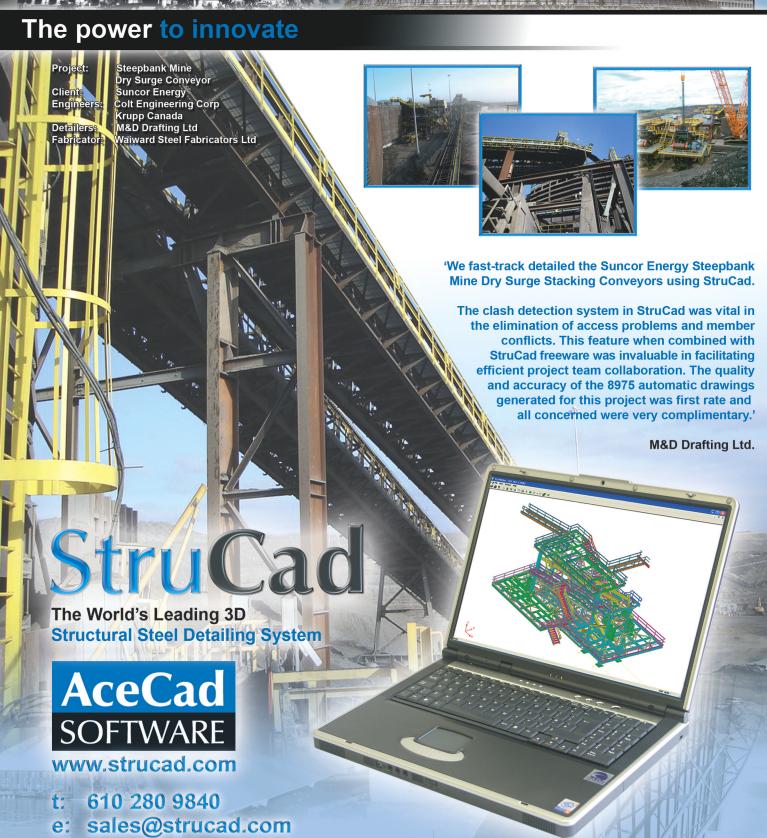
MODERN STEEL CONSTRUCTION (Volume 48, Number 3). ISSN 0026-8445. Published monthly by the American Institute of Steel Construction (AISC), One E. Wacker Dr., Suite 700, Chicago, IL 60601. Subscriptions: Within the U.S.—single issues \$3.50; 1 year, \$44; 3 years \$120. Outside the U.S.—single issues \$5.50; 1 year \$88; 3 years \$216. Periodicals postage paid at Chicago, IL and at additional mailing offices. Postmaster: Please send address changes to MODERN STEEL CONSTRUCTION, One East Wacker Dr., Suite 700, Chicago, IL 60601.

AISC does not approve, disapprove, or guarantee the validity or accuracy of any data, claim, or opinion appearing under a byline or obtained or quoted from an acknowledged source. Opinions are those of the writers and AISC is not responsible for any statement made or opinions expressed in MODERN STEEL CONSTRUCTION. All rights reserved. Materials may not be reproduced without written permission, except for noncommercial educational purposes where fewer than 25 photocopies are being reproduced.









# editor's note



WHETHER IT'S GENERATIONAL OR THEY'RE JUST GOOD KIDS, all of my children are very concerned about the environment. For my daughter, Julia, it takes the form of organizing a recycling effort at school. For my son Joshua, it's just an outgrowth of his fascination with nature (he's gone so far as to create a web site, ideastosavenature.weebly.com, to solicit ideas on improving the environment). And even my youngest, Jason, goes to nature camp.

A few months ago I mentioned that the 2008 NASCC: The Steel Conference (April 2-5 in Nashville) was working to be a greener conference (which is only natural, given steel's dominant role as the green building material). The organizers of USGBC's GreenBuild Conference make a big issue of their green efforts; it turns out we're doing many of the same things (plus a few more).

✓ Our conference bags are made from 51% post-consumer recycled materials (mostly discarded water bottles and yogurt containers).

✓ And speaking of water bottles, we're installing water coolers in the center and exhibit hall and giving everyone a reusable bottle (we're still debating between polycarbonate and aluminum, but both are reusable and neither result in an off taste for the beverage).

✓ The temporary carpet in the exhibition hall contains recycled content (plus the padding is made from 95% recycled urethane material from chairs and car seats), and the carpet-cleaning shampoos are environmentally friendly.

✓ We've switched to online exhibitor service kits.

✓ Biodegradable trash can liners are used in cardboard wastebaskets in the exhibit booths (and our exhibitor services company has pledged to reduce energy consumption and waste, and use recycled materials wherever possible).

✓ The final program is being printed on recycled paper with sov-based inks.

✓ We're collecting the name badge holders for future reuse or recycling.

✓ The placards in front of meeting rooms and small signs throughout the conference are made with Enviroboard fiberboard (which includes 88% post-consumer waste).

And, of course, we have a number of sessions focusing on green design and construction (ranging from "Green Design: Beyond Material Issues" to "Cool Castings, High Strength Steels and Green Ideas from Europe" to "Greening the Shop: Strategies for Managing your Environmental Footprint").

But green issues are only a small part of the overall conference. I'm personally excited about our new "Essays from Experts" sessions. Unlike most conferences that put out a call for papers and then select from whatever has been submitted, the planning committee for the Steel Conference

typically decides on topics of interest and then seeks out the best possible speakers. Last year, we added a "Top Profs" track where we simply invited some of our favorite professors to speak on their field of expertise (we're continuing these sessions this year with sessions such as Tom Murray's "A 40-Year Perspective on Floor Vibrations" and Joseph Yura's "Five Useful Stability Concepts.") And this year we're expanding on the concept by inviting a group of industry and design professionals to give talks (such as Larry Griffis on "Wind or Seismic Loads-Which Governs?" and Duane Miller on "Important Lessons They Didn't Teach Me at College").

These are just a few of the more than 70 technical sessions offered—all of which provide continuing education credits. Plus, there are pre- and post-conference short courses (some of which are offered by AISC and some by other groups, such as ASCE/SEI and the American Galvanizing Association).

For fans of controversy, I recommend attending a session we've just added (it's not even in the advance program) comparing the new AIA construction documents with the new AGC-endorsed ConsensusDocs. The session will only be offered once, at 4:15 p.m. on Wednesday afternoon. At the same time (though also repeated on Thursday at 8 a.m.) is another controversial topic: "Should the Structural Engineer or the Fabricator Design Structural Steel Connections." Those sessions should give you plenty to talk about during the conference or at the conference dinner, which I'm so looking forward to. We've rented out a series of honkytonks in downtown Nashville, closed part of the street in front and the alley behind, and will have plenty of food and music!

I hope to see you in Nashville. It's a great chance to learn practical design and construction information, see the latest equipment, and network with clients and peers. For more information or to register, visit www.aisc.org/nascc.

SCOTT MELNICK

**EDITOR** 



### **Editorial Offices**

One E. Wacker Dr., Suite 700 Chicago, IL 60601 312.670.2400 tel 312.896.9022 fax

### **Editorial Contacts**

**EDITOR & PUBLISHER** Scott L. Melnick 312.670.8314 melnick@modernsteel.com

MANAGING EDITOR Keith A. Grubb, P.E., S.E. 312.670.8318 grubb@modernsteel.com

ASSOCIATE EDITOR Geoff Weisenberger 312.670.8316 weisenberger@modernsteel.com

# **AISC Officers**

**CHAIRMAN** Rex I. Lewis

VICE CHAIRMAN David Harwell

TREASURER

Stephen E. Porter SECRETARY & GENERAL

COUNSEL David B. Ratterman

**PRESIDENT** 

Roger E. Ferch, P.E.

VICE PRESIDENT John P. Cross, P.E.

VICE PRESIDENT

Louis F. Geschwindner, Ph.D., P.E. VICE PRESIDENT

Roberta L. Marstellar, P.E. VICE PRESIDENT Scott L. Melnick

### **Advertising Contact**

Account Manager Louis Gurthet 231.228.2274 tel 231.228.7759 fax aurthet@modernsteel.com

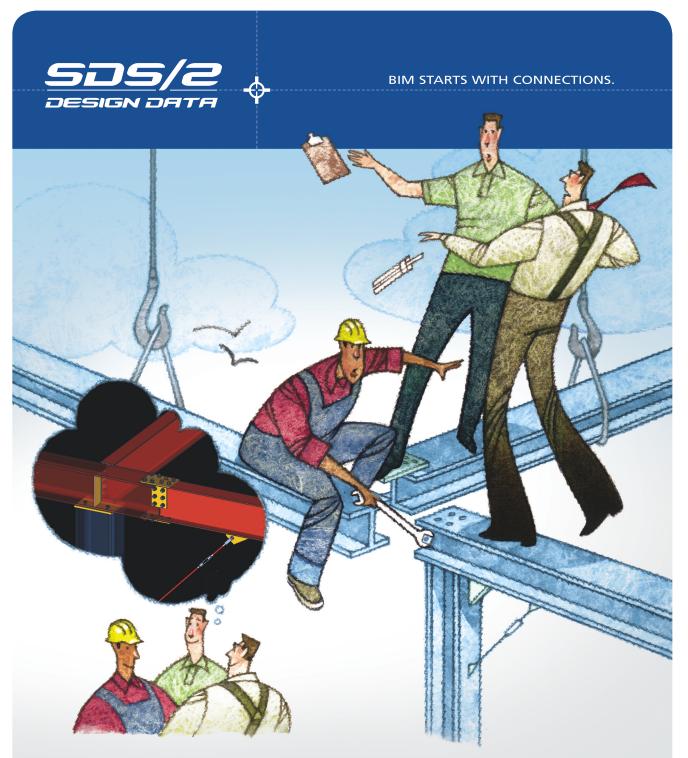
For advertising information, contact Louis Gurthet or visit www.modernsteel.com

# Address Changes and **Subscription Concerns**

312.670.5444 tel 312.893.2253 fax admin@modernsteel.com

### Reprints

Betsy White The Reprint Outsource, Inc. 717.394.7350 w.betsy@verizon.net



# Connecting with your partners has never been easier.

Make BIM more than a buzzword. Implement a BIM work process in your company using SDS/2. With features and products like CIS/2 interfacing and the Global Review Station, SDS/2 helps create better connections with your project partners. The result: less repetitive data, better communication and short project completion dates. Stop talking about BIM and start profiting from it. Call or visit our Web site today.

www.sds2.com

800.443.0782

402.441.4000

e-mail: info@sds2.com

# Are all of your pieces in place?



# Put it all together at the NASCC show in Nashville

Check out the powerful features in FabTrol MRP at the 2008 North American Steel Construction Conference in Nashville. You will have the opportunity to see the software and talk with customers who trust FabTrol MRP to help them manage their steel fabrication operations.

If you already use FabTrol MRP, the NASCC show is always a great time to get a closer look at any new modules you may be considering—so you can put all the pieces in place.

# Get connected at the FabTrol MRP customer event

Our upcoming customer event in Eugene, Oregon will provide valuable training on information exchange between FabTrol MRP and other software applications. The event will feature a unique training curriculum mixed with social events, industry speakers, and more. For event details, call us at (888) FABTROL.

NASCC show - Booth 809

Nashville, TN • April 2-5, 2008 Workshop • April 3rd • 5:30pm-6:15pm Value Chain Integration for Steel Fabricators

Get Connected Customer Event Eugene, OR • April 30-May 2, 2008 www.fabtrol.com/connect



FabTrol Systems, Inc. • 1025 Willamette St., Suite 300, Eugene, OR 97401 U.S.A. • (888) FABTROL • www.fabtrol.com

# steel interchange

**IF YOU'VE EVER ASKED YOURSELF "WHY?"** about something related to structural steel design or construction, *Modern Steel Construction's* monthly Steel Interchange column is for you! Send your questions or comments to solutions@aisc.org.

## **Historic Lattice Columns**

In the December 2007 Steel Interchange, there was a question pertaining to lattice columns. Ted Galambos, Ph.D., was kind enough to add his expertise on the subject:

You can find information about these historic types of columns in Section 3.4 of the 5th edition of the *SSRC Guide*, as well as in Section 2.18 of Timoshenko and Gere's *Elastic Stability*. In such columns, one needs to consider the effect of the reduction of the stiffness because of shear. Ignoring this effect is very serious and it was one of the causes of the first collapse of the Quebec Bridge in 1905.

# **Flexural Strength Comparisons**

The elastic moment strength of a beam listed in Table 3-6 of the 13th edition AISC manual seems low as compared to the 9th edition ASD manual and the 3rd edition LRFD manual. As an example, for a W16×77 with  $F_{\nu}$  = 50 ksi:

13th edition, Table 3-6, pp. 3-60 ASD:  $M_r/\Omega$  = 234 kip-ft LRFD:  $\phi M_r$  = 352 kip-ft

9th edition ASD, pp. 2-11 ASD:  $M_R$  = 369 kip-ft

3rd edition LRFD, Table 5-4, pp. 5-62 LRFD:  $\phi M_r$  = 405 kip-ft

Could you tell me why there are such differences?

The nomenclature is somewhat different between the manuals. In the 2005 specification,  $M_r$  is the moment capacity when  $L_b = L_r$ , the unbraced length at which the shape transitions from the inelastic to the elastic lateral torsional buckling range.

In the 9th edition manual, the  $M_R$  that is listed in the Part 2 Table is the beam resisting moment where  $F_b$  = 0.66 $F_r$ . For the difference between the 9th and 13th edition ASD procedure, you would really want to compare the  $M_p/\Omega$  (374 kip-ft) in the 13th edition tables with the  $M_R$  (369 kip-ft) value in the 9th edition tables.

The change between the 3rd edition LRFD and the 13th edition LRFD capacities is based on different equations of the buckling curves given in the two specifications. In the 3rd edition table, you will note that  $L_r$  was 25.3 ft. for the W16×77. In the 13th edition table, you will note that  $L_r$  is 27.8 ft.

Kurt Gustafson, S.E., P.E.

# **Multiple Cranes in Runway**

I am designing a building with three top-running bridge cranes. The cranes all run in the one aisle and are separated from each other by 20 in. The runway beams will be a simple span. Would I need to design the runway beam and building frame for vertical and horizontal loads from all three cranes being adjacent to each other and being fully loaded at the

same time? The MBMA design manual says to design for the single crane producing the most unfavorable effect and for the loads of two adjacent cranes producing the most severe effect. Is this due to a low probability of the cranes all being fully loaded at the same time?

The following advice pertaining to crane design parameters was provided by John A. Rolfes, P.E., S.E., of Computerized Structural Design, S.C.:

With regard to the effect of multiple cranes in one aisle (or in multiple aisles), no direction is provided in the building code. The appropriate combination of loadings is dependent upon the specific application and the judgment of the designer. The MBMA manual provides the recommendation cited by the questioner. AISE Technical Report No. 13 recommends three different load combinations (for crane loads). These are as follows:

- 1. For fatigue design considerations: maximum vertical loads from one crane, including vertical impact plus side thrust forces from one crane at 50% of maximum predicted values.
- 2. For strength design consideration: maximum vertical loads from one crane, including vertical impact plus side thrust forces from one crane at 100% of maximum predicted values.
- 3. For strength design consideration: maximum vertical loads (without impact) from the full number of cranes that may impart loads to the particular element of the structure being designed plus side thrust from one crane at 100% of maximum predicted values. (It is also not uncommon to consider 50% side thrust from multiple cranes acting simultaneously).

Disparities between the maximum loads from load cases 2 and 3 above are typically more pronounced in buildings with large bays. For all of these load combinations, the crane(s) must be positioned to generate the worst loading effect for the member being designed. The designer should try to understand the various operations that the crane is going to be used for and what the likelihood is for cranes to be spaced close together and fully loaded. We have worked on numerous projects where multiple cranes in an aisle are used simultaneously with a common lift beam to lift loads that exceed the capacity of each crane individually. This type of application would be covered by the use of load combination 3 above.

# **Evaluation of an Existing Structure**

If a building was built in the early 1900s, can we utilize LRFD design to check the existing steel beams?

You can use the current AISC specification, either ASD or LRFD, when investigating older structures, as long as you stay consistent in the load approach for load assumptions and capacity parameters. See Appendix 5 of the AISC specification (a free download at <a href="https://www.aisc.org/2005spec">www.aisc.org/2005spec</a>) for further discussion. When a local jurisdiction specifically requires a version of the AISC specification that precedes the most current version, we recommend ask-

# steel interchange

ing the authority having jurisdiction for approval to use the more current version.

Kurt Gustafson, S.E., P.E.

## **RBS Moment Connections**

- 1. When the cuts for an RBS are determined by a, b, and c (identified in AISC 358-05, Prequalified Connections for Special and Intermediate Steel Moment Frames for Seismic Applications), does this cut section need to develop the maximum moment as required for that member?
- 2. Bracing as per AISC 358-05, Section 5.3.1,(7) is required for RBS beams. If there is a steel decking floor system with shear studs on top of the RBS beam, can this flooring system be considered an adequate form of bracing for this beam?
- If the RBS is being used as a prequalified connection (as in AISC 358), then yes, the section has to develop its own plastic moment capacity. This moment capacity is, of course, smaller than the plastic moment capacity of the beam where the section is not reduced.
- 2. As per section 5.3.1 (7) Exception, supplemental bracing is not required if there is concrete structural slab (including concrete on deck) if the conditions in the exception are met. Please note that you cannot have shear studs installed in the protected zone above the RBS unless you have a tested assembly that includes them in this zone.

Amanuel Gebremeskel, P.E.

# **Backing Bar Thickness**

Is there an industry standard for the size (thickness) of backing bars used in moment connections?

Section 5.10.3 of AWS D1.1 provides a table of recommended minimum nominal thickness of backing bars. The thicknesses in that table depend on the weld process.

Kurt Gustafson, S.E., P.E.

# **Flexure of Single Angles**

Is there an accepted procedure for the design of a steel angle in bending supporting a uniform load? The compression leg is upward and unrestrained, while the load is seated on the other (horizontal) leg.

Please refer to section F10 of the 2005 AISC specification (a free download at www.aisc.org/2005spec) to see how to design such an angle. Don't forget to check the vertical leg for buckling according to F10.3.

Amanuel Gebremeskel, P.E.

# **Edge Distance for Anchor-Rod Holes in Base Plates**

I am trying to find a table or equation that gives the minimum/maximum bolt spacing required for the base plate, as well as the minimum edge distances. Any suggestions of where to look in the AISC manual or elsewhere would be much appreciated.

You will not find tables of anchor rod spacing or edge distance requirements for holes in base plates in the AISC manual. Such requirements result from the design process, base layout, and the intended function of the anchor rod in the base anchorage system.

For example, the AISC recommendation is that anchor rods should not be used to resist shear. If shear is not required to be resisted by the anchor rod, there is no specific required edge distance from the rod to the edge of the base plate. See FAQ 7.1.7 on the web site at **www.aisc.org/faq** for discussion on this subject. However, if engineers do assume that shear is resisted by the anchor rods, the bearing strength at the edge will need to be checked by the EOR.

Spacing of the anchor rods is a similar function of the design process as to what type of resistance the rod is intended to provide. There is an OSHA requirement of a minimum of four anchor rods for a column. If the rod is intended to resist tension forces, the cone development of the embedment will likely influence the spacing.

Kurt Gustafson, S.E., P.E.

The complete collection of Steel Interchange questions and answers is available online. Find questions and answers related to just about any topic by using our full-text search capability. Visit Steel Interchange online at <a href="https://www.modernsteel.com">www.modernsteel.com</a>.

Kurt Gustafson is the director of technical assistance and Amanuel Gebremeskel is a senior engineer in AISC's Steel Solutions Center. Charlie Carter is AISC's chief structural engineer, and Lou Geschwindner is AISC's vice president of engineering and research.

Steel Interchange is a forum to exchange useful and practical professional ideas and information on all phases of steel building and bridge construction. Opinions and suggestions are welcome on any subject covered in this magazine.

The opinions expressed in Steel Interchange do not necessarily represent an official position of the American Institute of Steel Construction, Inc. and have not been reviewed. It is recognized that the design of structures is within the scope and expertise of a competent licensed structural engineer, architect or other licensed professional for the application of principles to a particular structure.

If you have a question or problem that your fellow readers might help you solve, please forward it to us. At the same time, feel free to respond to any of the questions that you have read here. Contact Steel Interchange via AISC's Steel Solutions Center:



One East Wacker Dr., Suite 700 Chicago, IL 60601 tel: 866.ASK.AISC • fax: 312.803.4709

solutions@aisc.org



Peddinghaus technology is designed to work for your bottom line. Our equipment remains the industry benchmark for quality and productivity... providing pinpoint accuracy and rugged reliability. Our winning lineup includes: single and multiple drill lines, high-speed plate processing systems, speed sawing band saws, Anglemaster processors, and customer-designed

After a century of operation, we've learned that our customers come first. And we practice what we preach. With the strongest warranty, training, and service support program in the industry, Peddinghaus offers our customers every opportunity for success - today and in the future. Our customer service

- State-of-the-art Customer Communication Center and Parts facility 20+ knowledgeable telephone technicians
- Remote Diagnostic capability to access your machine and repair it in minutes

Our current business partners report increased shop productivity, which enhances new market opportunities...and leads to bottom line profitability. Since 1903, four generations of the Peddinghaus family have produced machines and a service organization that continue to sustain the future of our customers.

See us at NASCC **Booth #101** 



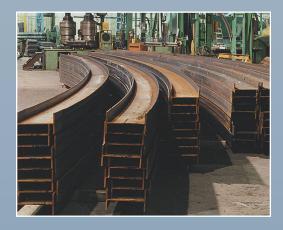
**BAND SAW** 

PLATE PROCESSOR

# **Hodgson Custom Rolling Inc.**

services a wide variety of industries in the ENERGY SECTORS of hydro, petro chemical, atomic, gas, oil, wind, etc. in addition to those in heavy manufacturing, steel, pulp & paper, mining, marine, forestry, etc. Hodgson's commitment to providing customers superior products and personalized professional service has earned itself a reputation for excellence, making the name HODGSON synonymous with "paramount quality and workmanship".









Hodgson Custom Rolling Inc. is one of North America's largest plate rolling, forming, section rolling and fabricating companies.

# STRUCTURAL SECTION ROLLING

Hodgson Custom Rolling has the expertise to roll curved structural sections into a wide range of shapes and sizes (angle, wide flange beam, I-beam, channel, bar, tee section, pipe, tubing, rail, etc.). We specialize in **Spiral Staircase Stringers**, flanges, support beams, gear blanks, etc.

# PRESS BRAKE FORMING & HOT FORMING

Hodgson Custom Rolling's brake department processes all types of steel sections and plate up to 14" thick. Developed shapes such as cones, trapezoids, parabolas, reducers (round to round, square to round) etc.

# PLATE ROLLING & FLATTENING

Hodgson Custom Rolling specializes in the rolling and flattening of heavy plate up to 7" thick and up to 12 feet wide. Cylinders and segments can be rolled to diameters ranging from 10" to over 20 feet. Products made include ASME pressure vessel sections. **Crane Hoist Drums**, thick walled pipe, etc.

# **FABRICATING**

Hodgson Custom Rolling combines expertise in rolling, forming, assembly and welding to produce various fabrications including kiln sections, rock drums, heavy weldments, ladles, pressure vessel parts, multiple **Components for Heavy Equipment** applications etc.



5580 Kalar Road Niagara Falls Ontario, Canada 12H 311 Telephone: (905) 356-8132 Toll-free: (800) 263-2547 Fax: (905) 356-6025 E-mail: hodgson@hodgson.on.ca Website: www.hodgsoncustomrolling.com

ASME ISO9001:2000

U.S. Address: M.P.O. Box 1526 Niagara Falls, N.Y. 14302 - 1526

# steel quiz

**LOOKING FOR A CHALLENGE?** Modern Steel Construction's monthly Steel Quiz tests your knowledge of steel design and construction. Most answers can be found in the 2005 Specification for Structural Steel Buildings, available as a free download from AISC's web site, **www.aisc.org/2005spec**. Where appropriate, other industry standards are also referenced.

This month's Steel Quiz was developed by AISC's Steel Solutions Center. Sharpen your pencils and go!

- $\P$  What does  $C_b$  represent?
- What value of  $C_b$  is permitted to be used for a simple span beam, braced at each end, supporting a uniform load for the entire span length?
- What is the difference between  $Z_x$  and  $S_x$ ?
- 4 Neglecting the fillets, how is  $Z_x$  of a W-shape calculated?

- Where can one find a summary of the appropriate limit states required to be checked for a flexural member of a specific shape configuration?
- When is it permitted to use the plastic section modulus  $Z_x$  for a flexural member design?
- What is  $L_p$  and how is it determined?
- How is the weak-axis nominal flexural strength of a compact W-shape determined?

- 9 How is the nominal flexural strength of a compact round HSS determined?
- 10 How is the nominal shear strength of a round HSS determined?

TURN PAGE FOR ANSWERS



**ProSteel 3D** is your complete solution for design, drawing production and fabrication. Completely customizable, **ProSteel 3D** is proven technology that saves time and increases profit in all aspects of steel construction. This intelligent steel modeling application works within **AutoCAD**.

- True 3D modeling of structures and connections
- Automatic creation of 2D details, 2D plans, layout drawings, shop drawings and BOM
- Easily generates stairs, ladders, cages, trusses and combined curved and user shapes
- CNC Communication to Peddinghaus, Controlled Automation, Ocean Machinery, Vernon Tools and Studmeister
- Communicates with analysis software
- Special functionality for offshore construction, lattice tower generation, pressure vessel design and light gauge construction







WWW.STRUCSOFTSOLUTIONS.COM 1-877-810-7575

Visit us at NASCC Booth 1101

# steel quiz

**ANSWERS** 

- $C_b$  designates the lateral-torsional buckling modification factor for non-uniform moment diagrams when both ends of the unsupported segment are braced. Equation (F1-1) of the AISC specification defines the permitted  $C_b$ .
- $C_b = 1.14$  is permitted for this case. See Table 3-1 in the 13th edition Steel Construction Manual for values of  $C_b$  for other support conditions for simply supported beams.
- $Z_x$  represents the plastic section modulus about the X-axis of a shape, where the full cross-section of the shape has yielded.  $S_x$  represents the elastic section modulus about the x-axis of a shape where the extreme fibers of the cross-section have reached the yield point.

Neglecting the fillets:

 $Z_X = [(b_f t_f)(d - t_f)] + [(t_w)(d - 2t_f)^2/4]$  for a W-shape.

- These limit states are provided in Chapter F of the 2005 AISC specification. Table User Note F1.1 in the 2005 specification provides a guide for the application of Chapter F Sections.
- The plastic section modulus  $Z_x$  is permitted to be used in the design of a flexural member if: (1) the slenderness of all elements in the cross-section is  $\leq \lambda_p$ ; and (2) the unbraced length of the member is  $\leq L_p$ .

7 L<sub>p</sub> is the limiting laterally unbraced length of a flexural member for the limit state of yielding:

 $L_p = 1.76 r_y \text{ sqrt } (E/F_y)$ Equation (F2-5)

The weak-axis nominal flexural strength of a compact W-shape is based on the limit state of yielding (plastic moment):

 $M_n = M_p = F_y Z_y \le 1.6 F_y S_y$ Equation (F6-1)

The nominal flexural strength of a compact round HSS is based on the limit state of yielding (plastic moment):

 $M_n = M_p = F_y Z$ Equation (F8-1)

10 The nominal shear strength of a round HSS is calculated based on the critical shear stress times one-half of the gross area of the cross section:

 $V_n = F_{cr} A_g/2$ Equation (G6-1)

# FloorVibe v2.02

# It's like having an in-house floor vibration expert!

**FloorVibe v2.02** helps solve problems with floor vibrations due to human activity in offices, residences, health clubs, convention centers, and buildings housing sensitive scientific equipment.

- Expert advice you need such as what live loads to use, how to estimate damping, and much more.
- Has databases for hot-rolled sections and castellated SmartBeams.
- Handles all joist types including composite joists
- Provides a complete design report for ease in checking.
- Automatically generates notes and warnings.
- \* Criteria based on the AISC/CISC Design Guide 11: Floor Vibrations Due to Human Activity.

For more information or to order, visit our web site, e-mail tmmurray@floorvibe.com, or call Structural Engineers, Inc. at 540-731-3330. **FloorVibe v2.02** is only \$345 per copy and **Design Guide 11** is \$30 per copy. Price includes technical support.

Seet Design Guide Series

Floor Vibrations
Due to Human Activity

includes

the new SJI

CJ Joists!

Anyone is welcome to submit questions and answers for Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866. ASK.AISC or at solutions@aisc.org.



www.FloorVibe.com

# **LEADER IN CONNECTION DESIGN SOFTWARE SINCE 1984**

# DESCON

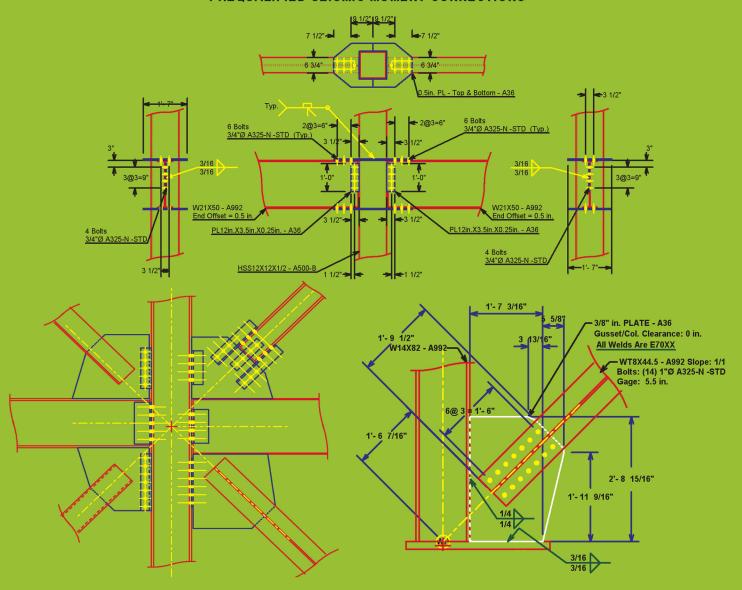
# The Ultimate Advantage in Connection Design

Excellent Quality \* Easy to Learn \* Simple to Use \* Outstanding Technical Support

# **DESCONWIN \* DESCONBRACE**

AISC SPECIFICATION 2005 \* SEISMIC PROVISIONS 2005 ASD \* LRFD \* METRIC (SI) \* IMPERIAL

SHEAR AND MOMENT CONNECTIONS \* COLUMN AND BEAM SPLICES \* BRACED FRAME CONNECTIONS
PREQUALIFIED SEISMIC MOMENT CONNECTIONS





Omnitech Associates, Inc.

www.desconplus.com



# HOW TIGHT DEADLINES BECOME A THING OF BEAUTY.

Bridging the gap between plans and construction is no easy task.

Especially with the added pressure of a short timeframe. As the largest producer of steel beams in the Western Hemisphere, we can get them to you quickly. Anywhere. And with ongoing communication we can ensure that your job gets done on time, within budget.

And when you consider that all of our steel is recycled, it's truly a thing of beauty.

www.nucoryamato.com

It's Our Nature.

# news & events

### **CODES AND STANDARDS**

# **Bridge Welding Code Updated for 2008**

The American Association of State Highway and Transportation Officials (AASHTO) and the American Welding Society (AWS) jointly develop the AASHTO/AWS D1.5M-D1.5 Bridge Welding Code. The Code has been adopted by most states and transportation authorities (cities, tollways, etc.) to assure weld longevity in structures carrying millions of vehicles. The first edition was published in 1988, with revised editions in 1995, 1996, and 2002. AWS policy does not authorize interim changes, except for errata published in the Welding Journal, so there were no official changes between editions. The latest edition, 2008, is now available. Changes include:

- → Providing welding guidance for two grades of high-performance steel—ASTM A709 (AASHTO M270) HPS 50W/HPS 345W and HPS 70W/HPS 485W—and deleting Gr. 70W/485W, a quenched and tempered Gr. 50W/345W. The HPS steels have higher toughness and better weldability and weathering characteristics, but their chemistry requires different welding consumables than Gr. 50W/345W or Gr. 70W/485W.
- → Tables 4.1, 4.2 have been revised, including moving the increasingly popular metal-cored GMAW electrodes to Table 4.1, thereby reducing the need for procedure qualification testing under Section 5.13. In addition, minor changes have been made to Tables 4.3 (unpainted steel), 4.4 (preheat), and 4.5 (stress relief holding time).

- → The suggested Weld Procedure Specification (WPS) and Procedure Qualification Test Record (PQR) forms provided in Annex III have been amended, based on input from fabricators, owners, and consumable producers. The PQR form now provides areas to document test parameters, witnesses, and results, reducing the potential for later questions or disputes. The WPS form now provides an area for listing all significant variables, clarifying expectations for welders and inspectors. Shops working for multiple owners may improve common acceptance with these updated forms.
- → Illustrations for specifying and measuring intended camber have been included. These images better define the desired camber and how to assess postwelding acceptance tolerances.
- → Machining and testing tolerances for performance test specimens are now included. These do not entail significant changes to test equipment or specimens; rather, they better define the geometry and finishing needed to ensure consistent test conditions and accurate results.
- → Storage requirements for fracture-critical welding consumables have been amended. The absence of hydrogen is critical for weld soundness, and even small hydrogen-induced cracks can propagate under cyclic loading. Fracture-critical consumables must be certified "low-hydrogen" by the producer, and

- they must be handled and stored to remain that way. Requirements include GMAW and FCAW reels, and clarify drying SMAW electrodes.
- → RT film type and scanning patterns for UT are now addressed in Section 6, and NDT qualifications have been correlated between Sections 6.1 and 12.8. Also, additional welder qualification requirements have been clarified between 12.8 and Section 5, Part B.
- → A commentary was added for Section 4, and extensive changes were made for other sections, including moving notes and italicized items from the Code to commentary sections, and replacing mandatory language ("shall" and "must") with permissive ("may").
- → Other clarifications and modifications include: welder grinding deficiencies during a PQR that also proves qualification; correcting weld-induced distortion; dimensional tolerances; plasma cutting joint faces; undermatching weld strength; and clarifying fillet soundness tests.

Some future expected changes include the following:

- → AWS has adopted a policy permitting interim code changes before a subsequent edition. This will not be common practice, but may allow new technology or avoid problem details.
- → Narrow gap improved electro-slag welding (NGIESW) is expected to be included in the next edition.
- → Combining Tables 4.1 and 4.2, and merging the qualification test requirements of 5.12 (max or min-max heat input) and 5.13 (production) are also expected in the next edition.
- → The use of partial joint penetration (PJP) welds perpendicular to tensile stress.
- → Gr.50S/345S will be included to cover rolled beams.

The *Bridge Welding Code* has evolved over the past twenty years and will continue to change, reflecting owners' needs for confidence, fabricators' needs for consistency, and the ever-changing technology of welding.

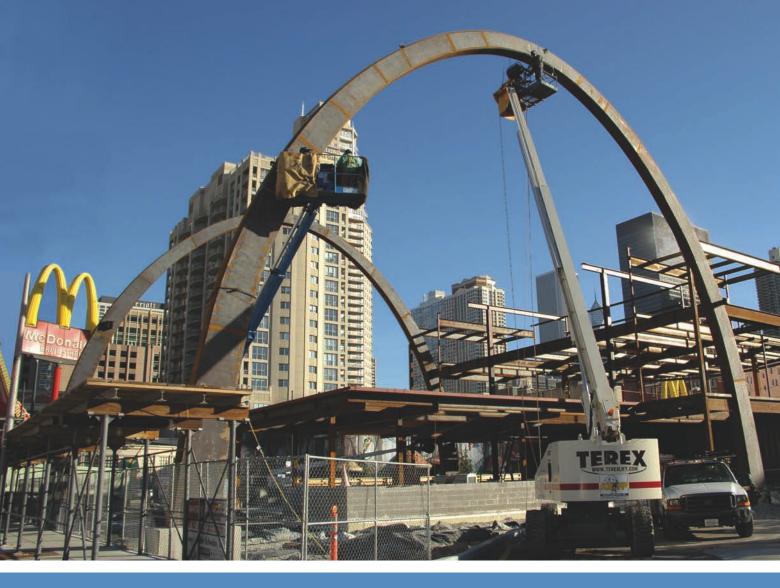
—By Jon Edwards, former fabrication engineer with the Illinois Department of Transportation and advisor to the AWS D1.5M-D1.5 Subcommittee.

# **A Separate Standard**

Bridge welding didn't always have its own code. It was originally covered in Section 9 in the AWS D1.1 Structure Welding Code – Steel. However, as AASHTO and individual states added requirements, fabricators found that they had to undergo separate, expensive qualification tests for different owners. So, in the early 1980s, AASHTO and AWS formed a joint committee to establish a document for all owners to adopt, resulting in AWS D1.5M-D1.5.

After the initial publication,

subsequent editions incorporated changes in technology, clarified areas of confusion or contention, improved efficiency for fabricators, and ensured that owners were satisfied with results. Significant changes included the addition of metric to the U.S. Customary units, Section 12 for Fracture Critical Welding (replacing the AASHTO Fracture Critical Guide Specification—which became the Fracture Control Plan for non-redundant structures)—and commentaries for Sections 1, 2, 3, 5, 6, 7, and 12.



# Super-Size Those Arches

Chicago Metal Rolled Products formed 20 x 12 tube into 60-foot-high, parabolic arches for this fast-paced project: the Rock 'n' Roll McDonald's in Chicago.

Curving each tube to multiple radiuses minimized costly and time-consuming weld splices.

To meet the customer's tight schedule, Chicago Metal completed all the curving within three days after he supplied material.

For savings on quality curving of structural steel, sheet and plate delivered to meet *your* schedule, call us.

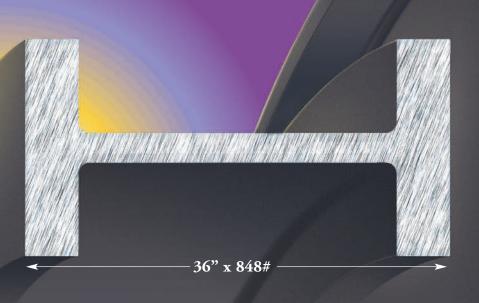




# This is BIG

Now we can bend your biggest beams on the world's largest beam roller.

- Curve (Camber/Sweep) Structurals up to 44"
- 3-Day, 2-Day, Next-Day, Same-Day Turnarounds Beams
- Quality, Service, Engineering Since 1908







Chicago, IL · Kansas City, MO

1-800-798-4504

www.cmrp.com sales@cmrp.com

# news & events

# letters

**GALVANIZING** 

# AGA Announces Informational Packets

The American Galvanizers Association recently released two new comprehensive informational packets intended to educate city/county and university officials on the benefits of using hot-dip galvanized steel in municipality and university projects.

The municipal packet, "Galvanize Your Community," touches on municipality projects, while the educational packet, "Galvanize Your University," focuses on educational institutions and university-based projects. Each packet contains a brochure that highlights many common considerations of any project, such as durability, sustainability, cost, and aesthetics, while explaining how the use of hot-dip galvanized steel meets these needs and more.

If you are interested in obtaining either of these free packets or have questions, please contact AGA Marketing Coordinator Robyn Burke at 720.554.0900, ext. 13 or rburke@galvanizeit.org.

**EVENTS** 

# **FMA and TPA China Tours**

The Fabricators & Manufacturers Association, International (FMA) and Tube & Pipe Association, International (TPA) have scheduled two tours to China in September that focus on sheet metal and tube and pipe, respectively. Each tour offers a unique opportunity to network with Chinese counterparts and witness China's capabilities firsthand.

The tube and pipe itinerary also includes a special visit to the All China-International Tube & Pipe Industry Trade Fair in Shanghai. Each tour includes:

- ✓ Visits to Chinese companies related to metal fabricating or tube and pipe, respectively, with current plans for plant tours in Guangzhou, Dongguan, and Shenzhen
- ✓ Meetings with China industry trade associations and government officials
- ✓ Transportation and accommodations in China (roundtrip airfare to China and an optional sightseeing tour are not included) Dates for the sheet metal tour are

September 13-20. Dates for the tube and pipe tour are September 20-27. For a complete itinerary, visit www.fmanet.org/china.

Deadline to reserve a place in either program is March 31. Space is limited.

# **Debatable Progress**

Although Mr. Arnold's points ring true ("Are We Making Any Progress?", January, p. 82), one cannot help pointing out that our disposable society holds no value to people working as "tradesmen."

I spent 5½ years in a shop doing things the "old-fashioned" way, learning many skills that are now deemed obsolete. When you consider the options there are, who would choose to toil as my father did for over 37 years only to wind up with a meager pension (only propped up by Uncle Sam, since the company went out of business), instead of finding a more lucrative profession?

Also consider that since all of our friends in Congress have auctioned off much of what is left in our country, there is little incentive for younger people to aspire to labor in a shop, whether dark and grungy or bright and heated, only to be laid off after two years due to market inequities.

**Gary Kiley** 

It's good to see this type of opinion piece ("Are We Making Any Progress?"). I would have preferred he had commented on how bad basic design plan quality and content has gotten in the last 15 or so years—and continues to worsen. I have taken a position in that period of time not to accept it, and the reaction has been generally negative from other professionals; so I concluded long ago that it was laziness.

As we work in most cases with basic structure, as is the case with the majority of commercial buildings, it is disoncerting that the functional quality of plans is so bad. We work with others' designs and do our own, and for more than 30 years have had a good method to critique ourselves. I believe it is as simple as caring about what you do.

It was probably 8-10 years ago that I wrote AISC about this issue. I recieved a letter in response that was generally favorable, relative to its content, but I have seen no appeal to the design professionals to get back on track.

Phil Fetzer, V.P. Sales Florida Welding Fabricators & Erectors, Inc.

# On Architects and Engineers

Your January Editor's Note column brings to mind architect Leopold Eidlitz's (1823–1908) critique of 19th Century American Beaux Arts "starchitecture." American architecture is the art of covering one thing with a second to imitate a third, which, if genuine, would not be desirable. "Plus ça change, plus c'est la même chose."

Jeremy Scott Wood, AIA Weston, Mass.

In response to Scott Melnick's insightful January Editor's Note, our experience with Gehry and Associates has been limited but positive. The architect's design for the Jay Prizker Pavilion trellis (an elaborate, open canopy) called for 570 tons of steel pipe as large as 20 in. in diameter to be curved in two planes with multiple radii.

Long before the design was finalized, engineers at Skidmore, Owings and Merrill consulted us about curving the steel pipe. Although Chicago Metal could have followed the original design concept, our architecturally trained estimator suggested that each arch be curved in only one plane, and that the radii—ranging from 100 ft to 1,000 ft—change at each nodal junction.

This design change simplified the geometry for curving, fabrication, and erection, thereby reducing cost and construction time without compromising aesthetics or function. Gehry and Associates agreed to the change and even added their own twist: Each arch has a slight sideways tilt.

John Zils of SOM said Chicago Metal's advice "was a significant contribution to the project." As the result of the cooperation and teamwork of all parties, the work was performed with such precision that the structural steel fabricator, Acme Structural; the erector, Danny's Construction; and the general contractor, Walsh Construction, all remarked how "the trellis pieces went together so well."

George Wendt, President Chicago Metal Rolled Products

# **Good Tips**

"59 Tips and More for Economical Design" (January, p. 57) was an excellent article. I know none of it is new, but I thought it was well presented, concise, and benefical to fabricators, detailers, and engineers. It is similar to a lot of sessions we have done previously, but this approach seems different. It would make a good session or even short course!

Larry W. Jeffords, President, Jeffords Steel and Engineering Co.

# Reaching for the Stars

BY SCOTT MELNICK

Contemporary architectural press covers architects with great fanfare—but where are the "Star-Engineers" that make their projects possible?

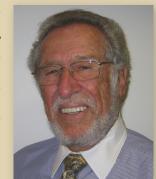
WHILE FRANK GEHRY, RAFAEL VIÑOLY, AND REM KOOL-HAAS ARE ALL HOUSEHOLD NAMES, you'd be hard-pressed to come up with a living structural engineer who has the same acclaim. Leslie Robertson, Larry Griffis, and Jim Fisher are widely recognized within the engineering community, but despite winning numerous and prestigious awards, are unknown to the general public. The "Starchitects" are well recognized; where are all the "Star-Engineers"?

After yet another perceived slight in a *New York Times* architecture review, Irwin Cantor (one of the name principals behind the well-known New York structural engineering firm WSP Cantor Seinuk) wrote a letter of complaint to that publication: "The

Nearly everyone has heard that New York's critically acclaimed Hearst Tower was designed by architect Norman Foster. But who was the structural engineer?

ability of a structure to resist gravity, wind, and earthquake are not primarily architectural functions," he stated. "Rather, they are engineering functions marrying the art and science of structural engineering with the availability of higher strength materials, which is turning these architectural aspirations into reality."

Cantor's point is that in most press coverage of the built environment, it is the architect who is credited with the design of the structure and the structural engineer is rou-



**Irwin Cantor,** WSP Cantor Seinuk, New York

tinely ignored. As a result, the readers of these articles get a false perception of design and innovation.

"Whether it be the Hearst, [New York] Times, or the Bank of America Tower in New York City, or any of the ever-more soar-

America Tower in New York City, or any of the ever-more soaring structures throughout the Middle and Far East, these 'atavistic preoccupations with celestial heights' could only be realized by the intimate collaboration of the architect and his structural engineer," Cantor continued. "Not to recognize the latter diminishes the integrity of the former."

Cantor's feelings are not uncommon in the structural engineering profession. "[His] comments are on the mark, but don't go far enough," stressed Ronald O. Hamburger, senior principal with Simpson Gumpertz & Heger in San Francisco. "It is not just the unusually shaped or super-tall building, but virtually every structure, that is a result of successful collaboration between the architect, the structural engineer, and other talented design professionals. However, I am afraid the public will never come to recognize the efforts of structural engineers in the same light as that of architects. The fault is not the public's or even the architect's, however, but rather structural engineers themselves. As a profession, we tend to be reclusive and uncommunicative, and seldom brag about our achievements. I once heard a joke that went: 'How do you tell an extroverted engineer from an introverted one? The extrovert looks at your shoes when he talks to you, instead of his own.' Structural engineers need to stop blaming others for their own failure to publicize their achievements, and do something about it. Let's be more vocal about our own achievements and those of our profession!"

## **Engineering as a Commodity**

Of course, not every structural engineer agrees. "Architecture critics (and architects) actually do recognize the importance of structural engineering; they know that today's spectacular architectural forms owe their existence to modern structural materials and techniques," stated R. Shankar Nair, a principal and senior vice president with Teng & Associates in Chicago. "But the critics (and many architects) also think of structural engineering as fungible, a commodity—an important and valuable commodity no doubt, but a commodity nonetheless—one that could be obtained interchangeably from any qualified source."

"Everyone understands that two architects given the same design challenge might come up with two very different solutions," Nair added. "It is not nearly so clear that the choice of structural engineer makes a difference. Most architects today use the structural engineer not as a collaborator to help develop the form of the building, but as an enabler whose function it is to make the architect's vision work in steel and concrete. Would any of Frank Gehry's buildings look very different if he had used a different (but equally competent) structural engineer?"

"Probably not. The vision is the architect's, turned into reality by the engineer, and the critic can be forgiven for crediting the architect alone for the form and character of the building. Yes, a good structural engineer was required for the success of the project, but so were good welders and brick-layers."

"There are exceptions, instances of true collaboration between architect and structural engineer," continued Nair. "The architectural designs of the Sears and John Hancock buildings in

are the ing Bu str lik the rig for me

**Ronald Hamburger,** Simpson Gumpertz & Heger, San Francisco

Chicago would not be what they are if Fazlur Khan had not been the structural engineer, collaborating with architect Bruce Graham. But these are exceptions. Sadly, for structural engineers who would like to see their names in reviews, the architecture critics are usually right to credit the architect alone for the architectural designs of most buildings."

Nair's opinion is echoed by Paul Goldberger, who received a Pulitzer as the *New York Times* architectural critic and who now writes for the *New Yorker*.

"While mentioning structural engineers in the context of architecture reviews is rare, it has happened," Goldberger said. "I recall that the engineer Fazlur Khan was credited along with Bruce Graham for the design of both the Hancock Center and the Sears Tower in Chicago—an attribution that I suspect was encouraged by Skidmore, Owings & Merrill, since Khan was a partner in the firm. I suspect that if Khan had lived longer and done



**R. Shankar Nair,** Teng & Associates, Chicago

more conspicuous projects, the same kind of joint attribution would have continued, and it might have encouraged a broader willingness to mention structural engineers."

"In general, however, structural engineers function as consultants, and it is usually not a practice to mention consultants, since a full list can often be as lengthy as the credits in a film. (To Irwin Cantor's argument that it would be impossible to realize the architect's vision without the structural engineer—which is altogether correct—I suspect that the zoning lawyers, the lighting consultants, environmental consultants, and the bankers might all say the same about how vital their work is to getting the building built.) And we might well ask: If the structural engineer is to be considered equal to the architect, then why doesn't the client hire the structural engineer first and let him select an architect as his consultant?"

Steven Litt, art and architecture critic at the *Plain Dealer* in Cleveland, agrees. "The premise seems to be that without engineers, architects would be unable to create their highly expressive structures. I'm not sure that's always the case. There must be a variety of possibilities, ranging from a true and equal collaboration between an architect and an engineer to situations in which the engineer provides a standard service in ways that would make different practitioners interchangeable."

# A Matter of PR

The issue of perception is critical to any discussion of this topic. "I have mixed views on this subject," commented David Scott, current chair of the Council on Tall Buildings and Urban Habitat and a principal at Arup's New York office. "However,

I certainly feel that engineers are under-recognized in the media, and the general public does not really understand what we do. This issue has been around for many years. Yet today, more than ever, there is a growing band of Starchitects, but very, very few Star-Engineers. I think that part of the problem is that the media love the cult of the personality and so when Frank Gehry does a

project, they like to focus on Frank as the maestro, rather than the 300 or so talented people in his organization who may have contributed to the project. Perhaps it's because as engineers we are trained to be realists and we tend to recognize that we can achieve very little without a strong and talented team. However, considering the engineering challenges associated with designing the Burj Dubai as the world's tallest building, which will be 50% taller than any existing building, it is a reflection of the engineer's status that



Blair Kamin, Chicago Tri-

ited exposure."

"When it comes to publicity, I don't necessarilv think that we engineers are any more modest than the architects we work with. However, as lead consultant the architect has more opportunity to interface with the press and can often decide where to focus their attention, whether it be aesthetics, engineering, or sustainability. I think that we need to educate the

press so that they can delve deeper into understanding what goes into a building so that they want to ask engineers about what we have done."

Of course, some architectural critics pride themselves on doing just that. Blair Kamin, the Pulitzer Prize-winning critic for the Chicago Tribune, is one of these, and he offers a series of stories he wrote back on August 18 of last year on supertall skyscrapers as evidence (http://www. chicagotribune.com/entertainment/ chi-070817tall-story,0,6407755.story).

Bill Baker [has] very lim- "Perhaps some of my colleagues ignore engineers because they don't understand the complexities of engineering or prefer to focus solely on aesthetics," Kamin stated. "But in Chicago, where the tradition of collaboration between architects and engineers has been long and fruitful, we recognize that you cannot fully understand a building without also understanding the crucial interrelationships between space

> "As a profession, we tend to be reclusive and uncommunicative, and seldom brag about our achievements."

and structure, economy and engineering, not to mention firmness, commodity, and delight." (If you don't recognize the last part of his comment, you're not an architect. It's a quote from the ancient Roman architect Vitruvius and has been adopted by the architectural community as their mantra; the words even appear on the reverse side of the Pritzker Award medal.)

But Kamin is probably the exception. "I hear from general contractors more than structural engineers wondering why they were not credited," said Robert Campbell, the architectural critic at the Boston Globe. "The problem from my end is that there are always, or almost always, many significant collaborators on any buildingnot only the official team, but clients, public and private agencies, consultants of all kinds, future users, owners, some bright new kid in the architect's office, who knows. It isn't easy to sort out who did what (everyone gives it a personal spin), and even if I could, I wouldn't have any room to list them, nor would such a list be of much interest to the general public for whom I'm usually writing. So I settle for naming the design architect and, usually, the architect of record if that's someone different. I have to assume that everyone knows architecture is collaborative."

# Outgoing vs. Shy

Arup's David Scott thinks a lot of the problem is one of personality. "Unlike architects, our livelihood is much more influenced by our company reputation as perceived by other building professionals,



# Cuts Faster. Works Harder. Lasts Longer.





27101 Tungsten Rd., Cleveland, Ohio 44132 800-243-1492 Fax: 800-261-6270

sales@americanpunchco www.americanpunchco.com

such as architects and developers, rather than architects whose future can depend on the reviews of their work, media interest, and public awareness. It is therefore not surprising that some of them can be real media hounds and forget all about their engineers. As a structural engineer I would like to be recognized for what I do. But what I do on a project varies enormously, as it does for any engineer. I would like to say that all my best engineering has been on the most beautiful buildings I have worked on. Interestingly, quite a lot of it is, because the best design comes from a true collaboration with an architect and engineer who have both great ideas and a client who is clear about what he wants. But you can also do innovative and exciting engineering on industrial and plain or ugly buildings. And if the design brief is fudged, or the architect will not collaborate, then you can still get some very nice buildings with mediocre or poor engineering. It's difficult for people to tell them apart. And I guess that engineers will only have the same profile as architects if we had some engineering critique of buildings that would slam poor concepts, overdesign, inefficiencies, or bad detailing."

It's a very touchy subject. "None of us want to alienate our clients, and it's hard to 'demand' recognition," stated Edward M. DePaola, president and CEO of engi-

neering firm Severud Associates in New York. "I know we've 'earned' it, but now the key is to get the client to 'recognize' it."

And it may be as simple as the perception of an architect as an ego-driven extrovert and the engineer as the bookish introvert. "I think it boils down to who has the better communication skills, architects or engineers," elaborated Dorothy Shinn, art and architecture

critic at the *Akron Beacon Journal*. "Whenever I write about a new building, I ask who to talk to, and I'm always steered toward the architects (or the architects' PR staff). This is probably because architects usually come equipped with a certain PR sense and know how to schmooze the



THE NEW HMD9048 SWIVEL BASE DRILL.

It's tough to line up precise center points especially in horizontal or upside down positions with a magnetic drill. But not with our new swivel base model. Get it close and engage the magnet. Release the swivel's quick unlock handle. Line up the pilot over the center point and lock the swivel. It's that simple and only takes seconds. Hougen makes the tough holes easy, again.

Visit us at NASCC Booth 501



800-426-7818 • www.hougen.com



David Scott.

**David Scott,** Arup, New York; Chair, Council on Tall Buildings and Urban Habitat



— (The only tool needed to attach G-Clips grating fasteners)

**G**-CLIPS TECHNOLOGY makes attaching grating to beams and structural members a no-brainer.

G-Clips install WITH HAND TOOLS, with NO DRILLING and NO WELDING to secure grating with EASE, ECONOMY & RELIABILITY.

Fasten grating from above using only one person. Just drop the **G-Clip** in, slide into place, then hand-tighten. **It's that easy**. They resist vibration loosening; won't damage beams, paint or coatings. The grating is undamaged—and the structure has no holes.

Models are available in galvanized carbon steel, 316 stainless steel, CuNi alloys and aluminum. Call today for a free sample and a catalog.



Grating Fasteners, Inc.

P. O. Box 6438, New Orleans, LA 70174 **800-227-9013** 

www.gclips.com • Email: sales@gclips.com

client (and therefore the press). Once in a while, however, I do talk to engineers, and I have to tell you, getting descriptive language out of an engineer is a challenge. I sometimes feel as though I've called the county sheriff instead of someone who's perfectly free to talk about the subject at hand. If, however, I do happen to get an

"I think that part of the problem is that the media love the cult of the personality..."

engineer who is able and willing to talk to me about a certain project, I have found a certain amount of superiority/impatience with those who aren't as conversant with all the structural, metallurgical, and mathematical fine points and jargon as they are. I would say, then, that engineers, generally speaking, lack good communication skills, and therefore would be much more likely to benefit from the services of a public

New Floorfix and pressed

steel Grating Clip secure

raised floors and grating

relations representative than architects, who tend to have both the skills and the reps."

Shinn's perceptions seem common among the architectural press. "I rarely write about skyscrapers, since the last one built in Cleveland went up in 1991," added the *Plain Dealer's* Steven Litt. "As for the art museums or other building types I cover, the answer would be that architects claim credit, and contributing engineers rarely or never ask for it. It would be interesting to know why they're so modest. Is it the culture of engineering? Do we have a culture among engineers in the U.S. in which teamwork is prized over individual authorship? Could that be a reason for the lack of recognition you describe?"

## **Credit Where Credit is Due**

Whether it's a focus on teamwork or the lack of public relations savvy, the fact remains that few structural engineers receive recognition. "Of course I like to see architects who respect and recognize their engineers," said Scott. "There are very few buildings where engineers really shape, inform, and influence a design in a fundamental way, and when they do this,

Division of Kee Industrial Products, Inc., Buffalo, NY

then they deserve equal billing with the architect. I have seen architects do this a few times, but not nearly enough. For bridge structures, engineers more than deserve this equal billing. When I lived in Hong Kong I led the design work on the Cheung Kong Footbridge, which in

my view is one of the nicest footbridges in the world. It won several awards for engineering and aesthetics, and we were recognized as engineers with the architects Leo Daley and Cesar Pelli. Yet I have always been reticent to say publicly that this is my design, despite me having as much influence on the aesthetics as the architect. That's because I am an engi-



**Jon Magnusson,** Magnusson Klemencic Associates, Seattle

neer and we do not like to speak out on aesthetics. At another extreme, two summers ago I went to see 'Foster's' Millau Viaduct in France. It has truly wonderful aesthetics, but I was stunned in the visitors' center when I could not find out the name of the structural engineer. "

And that lack may sum up the problem. "I think there are multitudes of factors including, not the least of it, human psychology," explained Ahmad Rahimian, a principal at WSP Cantor Seinuk. "But without getting into that, I think the press and the architectural critics know in general what we do and what our role is; however, they don't have an understanding of intricacies of [the] challenges that we are facing in reconciling the too-often conflicting aspiration of architecture with economic realities and construction capabilities, not to mention the laws of nature."

"I feel sometimes that society's awareness about the science and engineering has not improved a bit from the late nineteenth century, when many people discouraged Max Plank from studying physics since they believed 'everything was discovered and known already, and there is nothing to be discovered so he shouldn't waste his life!' I guess they now think in our field, everything [that] needs to be known is already known, thus our contribution to a project is mundane and clerical in nature rather than creative with a minefield full of chal-



We also manufacture

BoxBolt™ anchor bolts for

tubular steel connections

lenges, which quite often requires pushing the boundaries of knowledge."

"The irony is they very well know who to call when something somewhere goes wrong; whether [it] be a bridge in Minnesota, a hotel in Kansas City, a Shuttle in space, or another strong earthquake in one of the major cities. Unfortunately, those are the only times that the engineers are taking the spotlight from the architects: when something has gone wrong!"

Jon D. Magnusson, Chairman and CEO of structural firm Magnusson Klemencic Associates in Seattle, agreed, and added that the same holds true in many industries. "The conductor gets credit...but never plays a single note. The head coach gets credit...but never is in the game. The actor gets credit...but did not utter a word of his own. The architect gets credit...but doesn't know how to make his design stand up. It is just the way the world works. And it is not necessarily bad, because many times the musicians, payers, writers, and engineers would never get the same result without the person that pulls it all together to make it happen."

"Probably the ultimate test of 'credit' should be when things go bad, rather than when things go well. When an architectural design is successful, an engineer might be tempted to say, 'Couldn't have done it without me.' However, if the architectural design is not successful, that same engineer would probably say, 'Not my fault.'"

"Yes, many times engineers are essential to the creation of architecture, but the architect is the leader and has final responsibility for the overall design, and thus, should receive the most credit—or blame."

C o n c l u d e d
Rahimian: "I share
[David Scott's] sentiment in our collaboration with architects:
Our true reward is
when we work in a
collaborative manner, which usually
will result in creating
projects with body
and soul (structure
and architecture) in
harmony, respecting

the forces of nature."

Ahmad Rahimian, WSP Cantor Seinuk, New York

MS

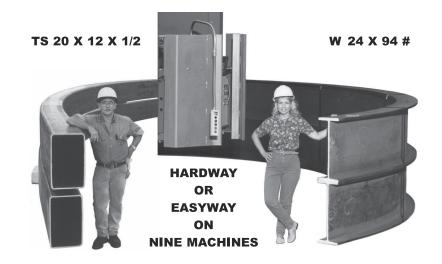
What do you think? E-mail your thoughts to melnick@aisc.org or post a comment at www.modernsteel.com/readerfeedback.

# WHITEFAB

**BIRMINGHAM, AL** 

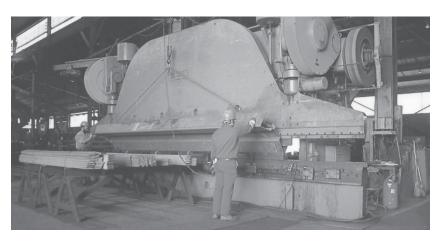
PHONE: 205-791-2011 FAX: 205-791-0500 EMAIL: sales@whitefab.com WEBSITE: www.whitefab.com

# ROLLING AND BENDING SPECIALIST





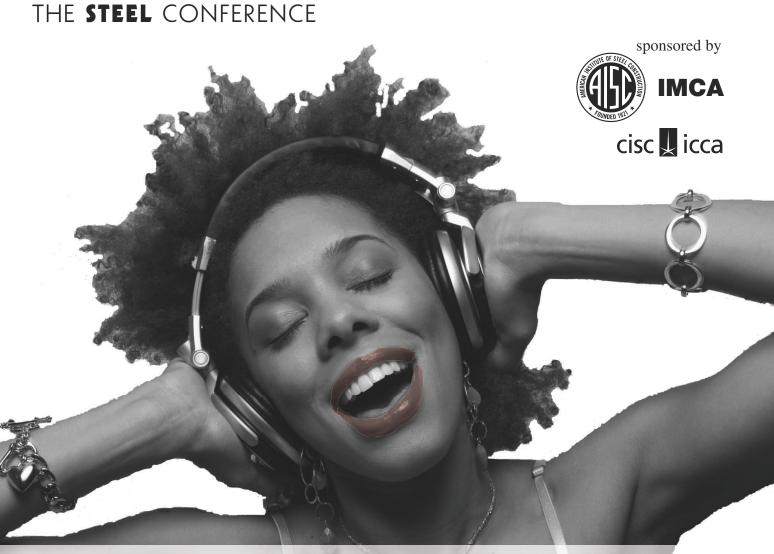
FULL LINE CNC MACHINING



1,000 TON PRESS BRAKE 30'-0" BED (20'-0" BETWEEN HOUSINGS)
ALSO - 1/2" X 20'-0" SHEAR; PLATE ROLLS; CUT TO LENGTH LINE

# 2008 ASC THE SERVICE CONFERENCE

# Incorporating the 2008 Annual Stability Conference



# Nashville Convention Center Nashville, Tennessee

Exhibits: April 2–4, 2008 • Conference: April 2–5, 2008

For full program and registration information visit

www.aisc.org/nascc

**Technical Seminars • Networking • Product Showcase** 

for Structural Engineers, Detailers, Erectors, and Fabricators

# **Going Beyond Material Issues**

BY MARK GORGOLEWSKI, PH.D., DIP. ARCH., LEED AP

# Steel's high ratio of recycled content isn't its only asset in the sustainability game.

**IN RECENT YEARS** the steel industry has made significant improvements in its environmental performance, such as reducing energy use in manufacturing steel, as well as reducing pollution and waste. Furthermore, some of the characteristics of steel as a material offer considerable opportunities for more sustainable ways of construction.

Nevertheless, when discussing positive aspects of sustainable steel in buildings, is seems that the focus inevitably turns to the material's recycling characteristics. These are clearly very significant and research has shown the clear environmental benefits of recycling steel and reusing steel components in construction. However, as the sustainability debate matures and as clients, designers, and contractors begin to want more comprehensive answers to questions about a material's green characteristics, the steel industry needs to develop a more holistic approach and stop hiding behind the positive, yet narrow, benefits of recycling.

The Leadership in Energy and Environmental Design (LEED) green building rating system provides multiple opportunities, besides recycling, for sustainability within the steel construction industry—where steel can help score points and where further development by the steel industry may offer further opportunities. In addition to LEED, it's also important for the steel construction industry to develop a fundamentally more green supply chain.

# **Developing a Green Steel Supply Chain**

A sustainable business must be a well-run, efficient, and profitable enterprise; its long-term viability relies upon its relationships with its stakeholders. Whether investors, owners, suppliers, employees, or customers, the aspirations of all stakeholder groups need to be understood and balanced to ensure the long-term success of an organization.

**Investors.** The business benefits of sustainability are increasingly recognized by investors. Socially responsible investment, increasingly being adopted by large institutional investors, is putting pressure on companies to adopt more sustainable practices. As the financial sector continues to adopt environmental and social issues in its investment decision-making, the message is clear: Companies will increasingly need to demonstrate their sustainable credentials to secure investment.

Financial markets throughout the world now monitor the sustainability performance of companies, and the evidence is mounting that sustainability pays. The Dow Jones Sustainability Index (DJSI), which includes the world's most sustainably managed companies, has significantly outperformed the standard Dow Jones Index in recent years.

**Suppliers.** Businesses committed to corporate social responsibility are passing this commitment down their supply chains. This means that suppliers are being required to consider, and often improve, their sustainability performance to match the highest standards within their supply chain.

The construction industry comprises many long, diverse, and complex supply chains. As companies implement more sustainable strategies, those suppliers not improving, measuring, and reporting their sustainability credentials to their customers will lose business.

**Employees.** Awareness of the importance of the social agenda is also increasing. Employees are a central part of any successful sustainable business or sector, and how they are looked after and managed is a key constituent of any corporate sustainability strategy. The health and safety of employees are of paramount importance, particularly within the construction industry, which, relative to most other sectors, has a poor track record. Staff skills, personal development, and retention are also key issues that need to be considered to ensure the sustainability of construction companies.

**Customers.** Customers are key drivers in implementing change. Not only should companies understand the needs and wishes of their customers, they should also be able to respond by offering new products and services at affordable prices. Everybody uses products supplied by the construction industry. Therefore, as sustainable development becomes more widely and publicly accepted, the construction industry must respond to this new agenda. This challenge represents significant opportunities to the industry.

### **LEED** and Steel

One way in which the steel construction industry can demonstrate seriousness to its stakeholders about sustainability is to engage in the current debate about how to achieve more sustainable buildings and to develop components, methods, and systems that can demonstrate improved environmental performance. The LEED rating system was developed to provide a standard for what constitutes a "sustainable building" and to transform existing building markets so that sustainable design, construction, and operation become mainstream practices. Although LEED should not be seen



Mark Gorgolewski is an associate professor in the Department of Architectural Science at Ryerson University, Toronto, and is also on board of the Canada Green Building Council (CaGBC).

This article has been excerpted from a paper to be presented at The Steel Conference, April 2-5 in Nashville, Tenn. Learn more about The Steel Conference at **www.aisc.org/nascc**. The complete paper will be available with the archived version of this article at **www.modernsteel.com/backissues**.

as the definitive description of sustainable building, there is considerable discussion about its structure and the values it espouses. Currently, LEED is the dominant method for assessing sustainability in buildings, and the steel industry can benefit by showing engagement in addressing the goals as set out in LEED.

LEED offers a third-party certification process whereby points/credits are collected within five main environmental performance categories: Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality. A sixth category deals with the Innovation and Design Process and aims to promote whole-building integrated design practices.

While steel can clearly garner credits in the Materials and Resources category, it can also play a role in the other categories as well (although that role is limited in the Indoor Environmental Quality category and nonexistent in the Water Efficiency category):

**Sustainable Sites.** This section deals primarily with issues of site selection, design, and access, as well as heat island and light pollution effects.

The wide-spanning capabilities, fast-track construction, integration of services,

just-in-time delivery, reduced storage requirements, less disruption on cramped sites, and lighter weight of steel buildings—leading to smaller foundations—all contribute to more workable steel solutions on difficult urban sites.

The use of steel structures and components also allows for much more prefabrication, as a significant portion of the process is removed from the site to controlled factory conditions. Reducing the amount of time spent on-site can lead to less detrimental impacts on the site. And, the development of appropriate prefabrication systems and management systems may allow difficult brownfield sites to be more easily developed.

**Energy and Atmosphere.** This section deals with strategies to help reduce energy use and protect the ozone layer and includes credits for energy efficiency, renewable energy, purchasing green power, additional building monitoring, avoidance of ozone-depleting materials, and additional commissioning.

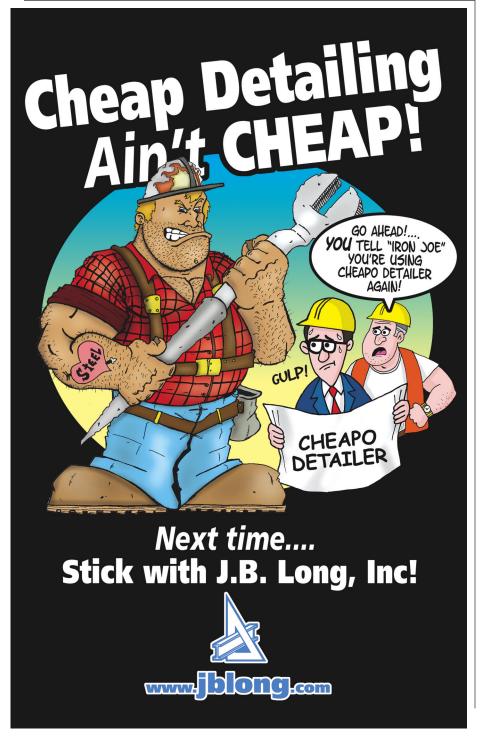
Steel structures can be readily designed to achieve the higher levels of energy efficiency required and can score additional points depending on the detail design of the building, its location, and fuel type used.

One issue that is often raised about steel-framed buildings is the lack of thermal mass, which can have a significant impact on commercial buildings. Thermal mass is important in buildings for its heat storage capacity, particularly in the cooling season. However, it is not the absolute amount of mass that is most important, but how well it is distributed and how well it is connected with the occupied spaces. Studies have shown that sufficient thermal mass can readily be incorporated in steel-framed office buildings to reduce cooling loads, and that the structural framing makes little difference to cooling loads (see "Making the Most of Thermal Mass," in the October 21, 1999 edition of Architects Fournal).

The steel industry needs to develop design guidance for the appropriate integration of thermal mass and exposure of mass in buildings. This means careful specification of finishes to ensure that the mass is not insulated from the internal spaces.

**Materials and Resources.** This section focuses on building reuse: waste management; reused, recycled, or certified materials; and reducing travel distances for construction materials.

This is perhaps the section that affects the steel industry most, and steel's high recycled content is important in regards to this section; LEED certification requires



documentation from the steel suppliers verifying the recycled content and manufacturing process.

However, other attributes of steel construction are also beneficial in this section. The potential for whole steel buildings and individual components to be reused is a major asset here. One of the credits for this category deals with whole building reuse while another awards points for component reuse. Thus, the steel industry should focus its guidance on flexibility and adaptability in steel buildings and the opportunities for deconstruction and component reuse.

When it comes to refurbishment, the ability to modify and reinforce existing structures is an important attribute of steel. There are many examples of steel-framed structures that have been adapted for a new use, and in some cases steel structures have been dismantled and reassembled in a new location. In addition, the lightweight characteristics of steel means that often, additional floors can be added to existing buildings, extending their usefulness.

Many steel components that are recovered from demolition or refurbishment projects are, or could be, suitable for reuse although most currently go to recycling. More components could be readily available if they were initially designed for easier deconstruction. These include structural sections, cladding, studs, and smaller components. Increasingly, designers are sourcing recovered steel components and specifying their use in new projects.

In addition, the use of steel components on-site generates very little waste, as the components are generally manufactured to tight tolerances in a factory and delivered to site for assembly. Thus, using steel components should contribute significantly to reducing site waste.

Another credit in this category is given for the use of "regional materials" in an effort to increase demand for locally manufactured materials, thereby reducing the environmental impacts of transportation and supporting the local economy. A regional material is defined as one that is extracted, processed, and manufactured within 500 miles of the site; if rail or water transport is primarily used, this distance is extended to 1,500 miles. Thus, locally salvaged steel would contribute to this credit, and the steel industry should consider establishing an infrastructure to help designers and contractors identify appropriate local steel.

The credits in this section are calculated using the value of the reused or recycled

material compared to the total value of materials. Since steel components often have a relatively high value compared to other building materials, they can contribute considerably to achieving this credit. LEED requires that the salvage status of each component be validated, but if the cost of reused components is lower than the new product equivalent, it allows the equivalent market value of new products to be used in the calculations.

**Innovation and Design Process.** This section allows a building to obtain up to four design innovation credits, as well as one additional credit for includ-

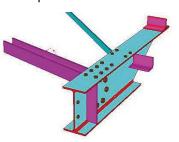
ing a LEED accredited professional in the design process. The design innovation may be awarded for achievements such as lifecycle analysis, community development, or education of occupants. Substantially exceeding one of the earlier credits may also warrant an innovation credit.

This is where innovative steel solutions can claim additional "bonus" credits. Possible options include design for future reusability, use of composite members to reduce material volume, use of innovative steel structural solutions that reduce material volume, and integration of structure and services.

# Having problems hiring and retaining skilled layout and fitting personnel?

Chances are you're like every other fabricator in today's market who answers "YES."

Ficep, the world's recognized technology leader in structural steel and plate fabrication systems, has made the first quantum leap in this process since the introduction of the beam line concept in the 60's.



Now you can go directly from a Tekla or X Steel 3-D model into Ficep's proprietary software where we automatically generate the CNC program for not just the holes but also the scribing data for all the required layout locations without any manual programming!

The CNC program is automatically generated with our proprietary software for processing on Ficep's CNC beam drilling and plate lines. This will contain not just holes but also the scribe lines for all four surfaces and part numbers to *locate and orientate* the required detail to the main member.

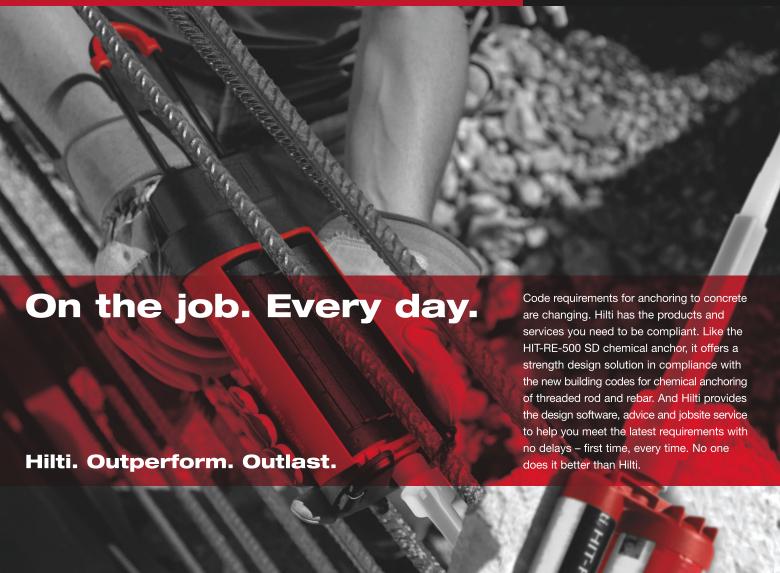
If your company wants to be an industry leader going forward and take the next quantum step in the reduction of your man hours per ton while solving the challenge of hiring and retaining layout personnel, give us a call. You will be truly amazed by our technology and how it will positively impact your operation!



108 2301 Industry Court
Forest Hill, Maryland 21050
410-588-5800 • 410-588-5900 fax
www.ficepcorp.com



# HIT-RE 500-SD Chemical Anchor



# **High Seismic Detailing and Fabricating**

BY TOM FERRELL, P.E., AND TONY HAZEL, P.E.

Projects designated as "high seismic" require special attention. Here's an introduction to some of the complexities of detailing and fabricating high seismic projects.

THE 2005 AISC SEISMIC PROVISIONS FOR STRUCTURAL STEEL BUILDINGS govern the design, fabrication, and erection of structural steel members and connections in the seismic load resisting systems (SLRS) and splices in columns that are not part of the SLRS, in buildings and other structures—where other structures are defined as those structures designed, fabricated, and erected in a manner similar to buildings—with building-like vertical and lateral load-resisting-elements.

The seismic provisions apply when the seismic response modification coefficient *R*, as specified in the applicable building code, is taken greater than 3, regardless of the seismic design category. When *R* is taken as 3 or less, the structure is not required to satisfy the provisions unless specifically required by the applicable building code. Members and connections of the SLRS must satisfy the requirements of the applicable building code, the AISC specification, and the seismic provisions.

The AISC seismic provisions give specific information to the structural engineer as to what to include on the structural design drawings and in the structural specifications. This information, provided by the structural engineer, is essential for the detailer, fabricator, and erector to ensure proper understanding and execution of the contract requirements. Although the structural engineer's responsibilities are beyond the scope of this presentation, the following information is necessary as a background to what a detailer and fabricator should expect to find on the structural design drawings and in the structural specification:

- Designation of the SLRS.
- Designation of the member and connections that are part of the SLRS.
- Configuration of the connections.
- Connection material specifications and sizes.
- Locations of demand-critical welds.
- Lowest anticipated service temperature of the steel structure, if the structure is not enclosed and maintained at a temperature of 50 °F or higher.
- Locations and dimensions of protected zones.
- Locations where gusset plates are to be detailed to accommodate inelastic rotation.

 Welding requirements as specified in Appendix W, Section W2.1.

The detailer, fabricator, and erector must have a knowledge and understanding of the following terms from the seismic provisions when detailing and fabricating a project designated as "high seismic":

**Seismic design category** is a classification assigned to a building by the applicable building code based upon its seismic use group and the design spectral response acceleration coefficients.

**Seismic response modification coefficient (***R***)** is a factor that reduces seismic load effects to a strength level specified by the applicable building code.

**Seismic load resisting system (SLRS)** is an assembly of structural elements in the building that resist seismic loads, including struts, collectors, chords, diaphragms, and trusses.

**Special Moment Frames** (SMF) are expected to withstand significant inelastic deformations when subjected to the forces resulting from the motions of the design earthquake.

**Intermediate Moment Frames** (**IMF**) are expected to withstand limited inelastic deformations in their members and connections when subjected to the forces resulting from the motions of the design earthquake.

**Ordinary Moment Frames** (**OMF**) are expected to withstand minimal inelastic deformations in their members and connections when subjected to the forces resulting from the motions of the design earthquake.

**Special Truss Moment Frames (STMF)** are expected to withstand significant inelastic deformation within a specially



Tom Ferrell is president of Ferrell Engineering, Inc., Birmingham, Ala.



Tony Hazel is senior design engineer for Ferrell Engineering's Columbia, S.C. office.

This article has been excerpted from a paper to be presented at The Steel Conference, April 2-5 in Nashville, Tenn. Learn more about The Steel Conference at **www.aisc.org/nascc**. The complete paper will be available with the archived version of this article at **www.modernsteel.com/backissues**.

# BUILDING BRIDGES BINI-JACK

# Mi-Jack Travelift® MJ Series RTG Cranes Versatility, Performance, Productivity...

Mi-Jack Products has been engineering and manufacturing material handling equipment since 1954. Through superior design and engineering, the Mi-Jack Travelift<sup>®</sup> Rubber Tired Gantry Crane is recognized for it's durability and reliability.

The "MJ" Series Traveliff® crane boasts superior hoist, traverse, and drive systems along with re-designed cab and engine compartment, for better productivity, ease of maintenance and a lower operating cost. With custom dimensions (heights and widths) and capacities ranging from 20 to 150 tons, the Travelitf® RTG crane is sure to handle all of your lifting needs.

Give us a call today and find out how the New MJ Series Travelift<sup>®</sup> crane can provide you the Versatility, Performance and Productivity you need: (800) 6-MI-JACK or visit us at www.MI-JACK.com

© Mi-Jack Products, Inc., 3111 W. 167th Street, Hazel Crest, IL 60429



Sharon Stairs Sharon Stairs Sharon Stairs



Please visit us at www.sharonstair.com to download all Details & Specifications



1-800-792-0129 sales@sharonstair.com



Sharon Stairs Sharon Stairs Sharon Stairs

designed segment of the truss when subjected to the forces from the motions of the design earthquake.

**Special Concentrically Braced Frames (SCBF)** are expected to withstand significant inelastic deformations when subjected to the forces resulting from the motions of the design earthquake.

Ordinary Concentrically Braced Frames (OCBF) are expected to withstand limited inelastic deformations in their members and connections when subjected to the forces resulting from the motions of the design earthquake.

**Eccentrically Braced Frames (EBF)** are expected to withstand significant inelastic deformations in the links when subjected to the forces resulting from the motions of the design earthquake.

**Buckling-Restrained Braced Frames** (BRBF) are expected to withstand significant inelastic deformations when subjected to the forces resulting from the motions of the design earthquake.

**Special Plate Shear Walls (SPSW)** are expected to withstand significant inelastic deformations in the webs when subjected to the forces resulting from the motions of the design earthquake.

**Protected zones** are areas of members in which limitations apply to fabrication and attachments.

**Demand-critical welds** are welds that are part of the SLRS that are deemed to be critical, since they transfer important earthquake loads.

**Prequalified connections** are connections that comply with the requirements of Appendix P of the Provisions (ANSI/AISC 358)

**Continuity plates** are column stiffeners at the top and bottom of the panel zone; they are also known as transverse stiffeners.

**The k-area** is the region of the web that extends from the tangent point of the web and the flange-web fillet (AISC's k dimension), a distance of  $1\frac{1}{2}$  in. (38 mm) into the web beyond the k dimension.

# **Detailing High Seismic**

**Shop Drawings:** AISC *Seismic Provisions* Part 5.2 and Appendix W, Section W2.2.

Shop drawings shall include items required by the AISC specification and the following, as applicable:

- 1. Designation of the members and connections that are part of the SLRS.
- 2. Connection material specifications.
- **3.** Locations of demand-critical shop welds.

- **4.** Locations and dimensions of protected zones.
- Gusset plates drawn to scale when they are detailed to accommodate inelastic rotation.
- 6. Welding requirements as specified in Appendix W, Section W2.2 Shop drawings shall include, as a minimum, the following information:
  - **a.** Access hole dimensions, surface profile, and finish requirements.
  - **b.** Locations where backing bars are to be removed.
  - **c.** Locations where weld tabs are to be removed.
  - **d.** NDT to be performed by the fabricator, if any.

**Erection Drawings:** AISC Seismic Provisions Part 5.3 and Appendix W, Section W2.3.

Erection drawings shall include items required by the AISC specification and the following, as applicable:

- 1. Designation of the members and connections that are part of the SLRS.
- **2.** Field connection material specifications and sizes.
- 3. Locations of demand-critical field welds.
- **4.** Locations and dimensions of protected zones.
- **5**. Locations of pretensioned bolts.
- 6. Field welding requirements as specified in Appendix W, Section W2.3 Erection drawings shall include, as a minimum, the following information:
  - **a.** Locations where backing bars are to be removed.
  - **b.** Locations where supplemental fillets are required when backing is permitted to remain.
  - **c.** Locations where weld tabs are to be removed.
  - **d.** Those joints or groups of joints in which a specific assembly order, welding sequence, or welding technique—or other special precautions—are required.

# **Fabricating High Seismic**

## **Personnel Requirements**

- Welders shall pass the Supplemental Welder Qualification for restricted access welding; see AWS D1.8 Annex C. Tack welders are not required to perform the SWQRA.
- 2. Each welder shall be assigned an identification symbol or mark.
- **3.** QC welding inspectors shall be associate welding inspectors (AWI) or higher.

- 4. QA welding inspectors shall be welding inspectors (WI) or senior welding inspectors (SWI).
- 5. Nondestructive testing (NDT) technicians shall meet special qualification requirements.
- 6. These requirements are in addition to normal AWS D1.1 qualifications.

# Structural Steel Material Requirements

- 1. Charpy V-Notch (CVN)
- 2. Hot-rolled shapes with flanges ≤ 1½ in. thick
- 3. Plates 2 in. and thicker
- 4. 20 ft-lb at 70 °F

# **Weld Requirements**

- Welding Procedure Specifications (WPS) shall meet AWS D1.1 and requirements for demand-critical welds.
- 2. WPS shall list electrode manufacturer and trade names.
- WPS shall list one or more combinations of welding variables that produce heat inputs within acceptable established AWS ranges.
- **4.** Must use approved processes for demand-critical welds (SMAW, GMAW, FCAW, and SAW). Other processes are

- allowed, provided certain criteria are met.
- **5.** Gas-shielded process is allowed when air velocity does not exceed 3 mph.
- 6. Filler Metal Diffusible Hydrogen: maximum of 16 ml per 100 grams deposited weld metal. Certain variances and exemptions may be applicable.
- 7. Intermix of FCAW-S filler metal.
- 8. Weld tabs.
- 9. Bottom flange welding sequence.
- 10. Notch-toughness characteristics.
- **11.** Storage and exposure of FCAW electrodes.
- 12. Maximum interpass temperature.

## **Fabrication**

- 1. Demand-critical welds.
- **2.** Forbidden items within the protected zone:
  - a. Tack welds, erection aids, arc-air gouging, thermal cutting, etc. Repair when required.
  - **b.** Welded shear studs and penetrating decking attachments. Decking arc spot welds to secure the deck are permitted.
  - **c.** Welded, bolted, screwed, or shot-in attachments for perimeter edge angles,

exterior facades, partitions, duct work, piping, or other construction.

# **Continuity Plates and Stiffeners**

- 1. Inside corner clips (curved or straight).
- 2. CJP or heavy fillets.
- 3. Hold fillets back ¼ in. from edge.
- **4.** Where specified backing bars are to be removed, back gouged, and re-welded.
- **5.** Where specified supplemental fillet welds may be used where backing bars are permitted to remain.
- Joints or groups of joints may specify a specific assembly order, welding sequence, welding technique, or other special precautions.
- 7. Access hole dimensions, surface profile, and finish requirements.

## **Tack Welds**

All bolted faying surfaces shall meet requirements for Class A surfaces or better.

### References

AISC Seismic Provisions for Structural Steel Buildings, including Supplement No. 1, 2005; Appendices P, Q, and W.

AISC Seismic Design Manual, 2006. AWS D1.8

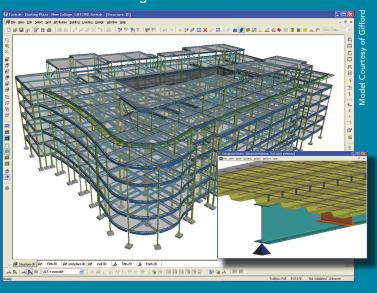




# ► FASTRAK<sup>TM</sup> BUILDING DESIGNER

CSC is pleased to announce the imminent US release of Fastrak Building Designer - Europe's market leading, proven steel building design software that will save you time and money. Go to **www.cscworld.com/fastrak** to arrange your pre-release demo which will highlight the following benefits:

- ▶ The latest intuitive 3D interface for rapid model creation
- ► Unlimited geometrical building complexity
- ► Fully automatic gravity and lateral design in one model
- ► Automated detailed composite design
- ► Revit Structure integration





Fastrak Building Designer is the most comprehensive, easy to use, dedicated software solution for general steel and composite building design. Complete physical design models are quickly created via an intuitive interface. Full model validation allows you to make changes with minimum effort. It produces fast, accurate, gravity and lateral design results, automated drawings, material lists and is BIM compliant. Fastrak Building Designer is market leading, proven software that will save you time and money.



Tel: 877 710 2053 Web: www.cscworld.com Email: sales@cscworld.com

**CALCULATIONS** 

**ANALYSIS** 

DESIGN

3D MODELLING

**DRAWINGS** 

SUPPORT & TRAINING

# Quality Assurance for Structural Engineering Firms

BY CLIFFORD SCHWINGER

Implementing an in-house quality assurance program benefits your firm, your employees, and your clients.

THE STRUCTURAL ENGINEERING PROFESSION has undergone dramatic changes over the past twenty years. With fast-track construction, computerized design, complex building codes, and younger engineers taking on more responsibility earlier in their careers, the need for structural engineering firms to have a comprehensive in-house quality assurance program has never been greater. Adopting such a program will result in better design, high-quality contract documents, fewer RFIs and change orders during construction, a better product for clients, and increased profitability for engineering firms.

# **The Quality Assurance Program**

A quality assurance (QA) program is a defined set of procedures and standards used to facilitate design and to facilitate documentation of that design. Implementation of a QA program results in:

- ✓ Better design
- ✓ Better drawings
- ✓ A more efficient design process
- ✓ Fewer mistakes
- ✓ Fewer RFIs and change orders
- ✓ Increased client satisfaction
- ✓ Enhanced reputation
- ✓ Increased profits

Prior to 1990 the concept of formal QA programs was virtually unheard of within the profession. Quality was assured by relying on the experience, skill, continual oversight, and expertise of trained engineers, structural designers, and drafters. Structural design was a linear process and contract documents were usually not issued for bid until the design and the drawings were 100% complete. Formal QA programs, where they existed, consisted primarily of a senior engineer being assigned as the "go-to" person for answering technical questions. That engineer would also review the drawings before the project went out for bid, providing a second set of eyes on the contract documents in order to catch mistakes. Such a QA program, consisting of a "technical guru" and a single QA review, does not work today.

Today, a comprehensive QA program requires the following components:

- ✓ Training for young engineers
- ✓ Design standards
- ✓ Drafting and CAD standards
- ✓ A project delivery system
- ✓ A knowledge base
- ✓ Involvement of the QA manager and QA reviews

# **Training for Young Engineers**

Before computers were commonplace, young engineers working in design offices typically spent the first several years of their careers doing repetitive manual calculations. Most new engineers also spent time "on the board," learning the art of structural drafting under the guidance of experienced engineers and senior drafters. The training of a young engineer was a gradual process. As experience was gained, more responsibility was delegated: reviewing shop drawings, developing details, and eventually coordinating projects with architects and answering questions from contractors. Computers have eliminated most laborious manual calculations, and while they have greatly increased productivity, computers have also altered the informal training phase that all new engineers

go through. Young engineers today are faced with the challenge of taking on much more responsibility early in their careers. Further challenging a young engineer's development in the profession are complex building codes, the details of which are usually not learned in school, and the lack of any knowledge of structural drafting, a skill which is just as valuable today as it was years ago. The ability to convey one's ideas to paper for interpretation by others will always be an essential



Clifford Schwinger is a vice president and quality assurance manager at The Harman Group, King of Prussia, Pa.

This article has been excerpted from a paper to be presented at The Steel Conference, April 2-5 in Nashville, Tenn. Learn more about The Steel Conference at **www.aisc.org/nascc**. The complete paper will be available with the archived version of this article at **www.modernsteel.com/backissues**.

skill. For moderate to large-sized engineering firms, the solution to this problem is establishment of a formal in-house training program.

Training for young engineers should consist of in-house lunchtime training seminars covering the full spectrum of structural engineering topics that are pertinent to the type of work performed by the firm. Because the goal of the training program is to pass on the combined knowledge of the senior staff, the list of topics for these seminars is long. Passing knowledge includes not just interpretation of codes, standards, and design procedures, but also a discussion of practical applications and lessons learned. These seminars are best conducted once or twice per week. While some topics can be covered in a single session, others, such as structural steel connection design, can take several sessions to fully cover.

Seminars focus on actual application of the principles discussed and are interspersed with lessons learned, discussion of common mistakes, examples of manual calculations, and tips and techniques for verifying the accuracy of computer analysis and design. Software limitations and assumptions are reviewed with a continual emphasis that computers are tools to be properly used by engineers; the creativity and solutions to structural engineering challenges come from the mind and imagination of the engineer, not the computer.

#### **Design Standards**

Design standards are comprised of formal design procedures, design guides, and checklists.

Medium and large engineering firms must have written formal design procedures, standards, and methodologies in order to produce consistently high-quality designs and to minimize the risk of errors due to miscommunication. Office standards must be formally established so that there is no confusion regarding design procedures and methodologies. Is office policy to use ASD or LRFD design? Is the policy to show beam reactions on framing plans or to require that shear connections be designed for a percentage of the member uniform load capacity? Are connections designed by the engineer of record or is connection design delegated to the steel fabricator's engineer? Is there a minimum percentage of code wind load below which the wind tunnel wind pressures will not be used? Serious consequences could result if two engineers are working on a project, with one showing service level

member reactions on the framing plans and the other showing factored reactions. The purpose of office design standards is to keep everyone on the same page and to provide a roadmap to insure uniformity of design

Design guides are one of the ways that design procedures are set forth. Design guides delineate office policy regarding design procedures and bring together building code and design standards, text-book theory, local construction practices, practical applications, and lessons learned.

Checklists are useful tools both for engineers new to the profession, as well as for experienced engineers trying to remember the hundreds of things that go

"While computers
are indispensable
tools, they will never
replace the judgment of
experienced engineers
who have mastered
the art of structural
engineering."

into design and documentation of a building. While major items like reviewing diaphragm strength and stiffness are well ingrained into a seasoned engineer's mind, little things like remembering to coordinate locations of fall protection tiebacks on the roof might occasionally slip by but for reminders provided on checklists.

#### **Drafting and CAD Standards**

Structural drafting is fast becoming a lost art. Whereas mechanical drawing used to be taught to students in high school and college, many engineers now arrive in the profession with no training in a skill that is essential for communication of their design intent to others. Likewise, most structural drafters have now been replaced by CAD operators who, while proficient in use CAD software, may be lacking in the knowledge and understanding of how to lay out framing plans, draw weld symbols, or dimension details. The solution to this problem is to establish drafting and CAD standards, the components of which include:

- ✓ standardized drafting procedures
- ✓ CAD checklists

- ✓ a library of typical details
- √ "go-by" drawings
- ✓ a library of standard blocks

Drafting procedures include information related to rules for laying out framing plans, drawing sections and details, setting up column schedules, etc. Uniformity and consistency within the office requires that everyone draws objects consistently on the correct layers and uses the same linetypes and linetype scales. While these may seem like trivial issues having no bearing on structural design, they will improve the quality and legibility of a set of structural drawings.

Checklists include the myriad of things needed to produce complete and legible drawings. They cover things as seemingly minor as making sure north arrows are shown on the framing plans to more important items such as making sure that beam reactions are indicated.

A comprehensive structural engineering detail library will contain hundreds of typical details.

"Go-by" drawings are reference drawings that show examples of how to indicate information on framing plans, schedules, etc. While go-by framing plans may have originated from actual projects, they will usually be modified over time to include everything that can possibly occur on a framing plan. Go-by framing plans for various structural systems provide engineers and drafters a single point of reference to see how to properly draw anything they will encounter on the plans. The use of go-by drawings prevents younger engineers from using previous projects for learning how to show things on the drawings. While using other projects as a frame of reference is not necessarily a bad idea, doing so can lead to a gradual divergence of drafting standards in larger firms.

A standard block library is essential for increasing productivity and maintaining drawing uniformity. "Blocks" are pre-drawn objects such as bolts, angles, W-shapes, weld symbols, headed studs, section cuts, etc.

#### **Project Delivery System**

The project delivery system is a library of forms, checklists, procedures, and correspondence templates used for administratively carrying a project from inception through construction. The delivery system is divided into five sections:

- ✓ project startup
- ✓ schematic design
- ✓ design development

- ✓ contract documents
- ✓ construction administration

The project startup section contains things required at the beginning of a project such as a design criteria form listing design information such as the applicable building code, design standards, loads, wind, snow and seismic design criteria, summary of the structural systems being used and fire ratings required. Correspondence templates for letters to the client regarding information needed from the geotechnical consultant and wind tunnel consultant as well as correspondence templates that summarize presumed design criteria and required "due by" dates to meet schedules, etc. are provided.

The schematic design, design development, and contract document sections contain checklists and procedures related to the deliverables in each phase of design.

The construction administration section contains meeting agenda templates for the pre-steel-detailing meeting, the preconcrete meeting, and meetings with the inspector, as well as checklists to be used when reviewing shop drawings.

#### **Knowledge Base**

The knowledge base (KB) is a searchable electronic database of all knowledge related to structural engineering. The KB contains the notes from training seminars, design guides, design standards, drafting and CAD standards, and information on all other topics that engineers may need to access. The primary feature of the KB is that it's a single source for answers to all questions related to structural engineering. When a question or topic comes up for which there's no answer in the KB, that information is added. When problems occur or lessons are learned, the solutions to those problems and lessons learned are added to the KB.

#### Involvement of the QA Manager and QA Reviews

The QA manager is a senior level engineer who is responsible for establishing and maintaining engineering standards and for verifying that all design is done in accordance with those standards. The QA manager has the following responsibilities:

- Establishing and maintaining design and drawing standards
- Answering technical questions and getting the answers to those questions into the KB, as appropriate.
- Staff training
- Maintaining familiarity with all projects

- during design and providing input and suggestions, as required.
- Signing off on sections and details prior to them going to the CAD department. (A cursory review and signoff of sections and details by the QA manager is required to catch mistakes before sending sections and details to the CAD department. Such a review saves time and is informative for the engineer whose details are being critiqued.)
- Performing quality assurance reviews on all projects.

#### The Quality Assurance Review

Quality assurance reviews are in-house reviews conducted to verify that all design is performed and documented in conformance with the procedures and standards mandated by the QA program.

QA reviews serve two purposes. The primary purpose of QA reviews is to provide redundancy via a second set of experienced eyes on the drawings to catch mistakes, errors, or omissions. The second purpose is to monitor the effectiveness of the QA program. If the QA program is working properly and engineers are following the procedures and utilizing the resources provided therein, then problems, mistakes, errors, and omissions caught during the review should be minor. While the QA manager is usually the one who performs the reviews, other experienced engineers can likewise perform the task.

Changes in the way contract documents are now issued have altered the way QA reviews are performed. Until ten years ago a single QA review was performed prior to the contract documents being issued for bid. Fast-track construction scheduling now requires multiple reviews at stages during design. It's not uncommon to have eight or more reviews on large projects. While the number varies from project to project, a typical QA review schedule for a steel-framed structure on pile foundations might be as follows:

- 1. Pile bid
- 2. Steel mill order
- 3. Foundation concrete bid
- 4. Steel addendum/detailing issue
- **5**. 100% concrete
- 6. 100% structural steel
- 7. "Issued for construction" final review

Multiple reviews are also a good idea for those projects still delivered via the traditional design-bid-build process. Interim reviews will catch mistakes early, when corrections can be easily made.

There are two primary goals of QA

reviews. The first and most important goal is to review the contract documents to verify that the structure was properly designed, is efficiently framed, and is constructible. The second goal is to verify that the contract documents are complete, well detailed, correct, and coordinated. The goal of issuing complete and well-detailed contract documents is not just one founded on a desire to reduce RFIs and change orders; it is one that is essential to insuring structural integrity. Finishing the drawings during construction via the RFI process is a bad idea. Not only do RFIs frequently lead to change orders, unless senior level experienced engineers are the ones answering RFIs, mistakes can slip through as well. If the drawings are complete and well detailed before construction, those details will have gone through the scrutiny of the QA review process, and the probability of engineering mistakes being made during the process of answering RFIs during construction will be greatly reduced.

A variety of tactics are employed when performing QA reviews. Those tactics are as follows:

- ✓ Look at the big picture.
- ✓ Verify load paths.
- ✓ Review framing sizes.
- Look at connection details for constructability.
- Look for mistakes.
- ✓ Look for subtleties.
- ✓ Look at the drawings for constructability.
- ✓ Review for clarity.
- ✓ Look for omissions.
- ✓ Look for "little" little things.
- ✓ Look for the "big" little things.
- Verify that the structural drawings match the architectural and MEP drawings.

#### **Summary and New Challenges**

QA programs must be adaptable to the new challenges that continually occur. One challenge is that of recognizing the limitations and constraints of computer software and keeping up with software changes and improvements, all the while keeping in mind that while computers are indispensable tools, they will never replace the judgment of experienced engineers who have mastered the art of structural engineering. Another challenge is that of training highly motivated young engineers so that they are best equipped to be the skilled and productive professionals they enthusiastically strive to be. A comprehensive QA program can help them succeed and everyone benefits.

# We're for your next HSS order.

As North America's largest manufacturer of Hollow Structural Sections (HSS), we're relied upon by professionals in the construction industry to provide the most complete size range available.

With the industries' shortest cycle times, our four plants operate 24/7 to service all of North America. This ensures unparalleled customer service and your products delivered on time.

We're ready for your next order!

Largest HSS Selection Shortest Cycle Times Size Ranges: Square 1" to 16" Rectangular .75" x 1.5" to 20" x 12" Round 1.050" to 20" Wall Thickness .083" to .625"

Specifications: ASTM A500

ASTM A252

ASTM A53

**ASTM A847** 

CSA G40.21

R.O.P.S.





MANUFACTURING FACILITIES

HARROW, ON 800-265-6912

CHICAGO, IL 800-733-5683

BLYTHEVILLE, AR

PLYMOUTH, MI

SALES@ATLASTUBE.COM WWW.ATLASTUBE.COM











Visit us at NASCC Booth 627



DIVISIONS OF THE JOHN MANEELY COMPANY



# Roof Diaphragms and Low-Rise Seismic Design

BY COLIN A. ROGERS AND ROBERT TREMBLAY

When roof deck diaphragms are used to transmit lateral loads from seismic events to vertical bracing elements, more robust diaphragm designs may be be required.

SINGLE-STORY BUILDINGS typically incorporate a steel roof deck diaphragm that is relied upon to transfer lateral wind and seismic loads to the vertical bracing bents. Roof deck diaphragms in North America are commonly constructed of corrugated cold-formed steel panels that are connected to one another at sidelaps and to the underlying structure. Design of these diaphragms for in-plane shear forces can be carried out using the SDI Diaphragm Design Manual (Luttrell, 2004). The flexural capacity of the diaphragm can be developed through the use of continuous chord members (Fig. 1a). Transfer of the horizontal forces to the vertical bracing bents relies on the action of the diaphragm collector elements (Fig. 1a). Diaphragms may also contribute to the overall dynamic properties and response of a building due to their in-plane flexural and shear flexibility.

North American model building codes (ASCE, 2005; NRCC, 2005) and steel design specifications (AISC, 2005a,b; CSA, 2005) allow engineers to use reduced seismic loads in design, provided that the seismic load resisting system (SLRS) of the structure is adequately designed and detailed to withstand strong ground shaking through ductile response. Building codes and standards include special provisions to achieve satisfactory inelastic seismic performance for the various SLRSs used in steel building construction (Tremblay, 2005).

In particular, the design of the vertical structural system must be carried out with strict compliance to capacity design principles; i.e., fuse elements of the SLRS are sized and detailed to dissipate seismic input energy through cyclic inelastic response, whereas the remaining elements should be provided with sufficient capacity to carry the maximum forces that are anticipated along the lateral load path.

The vertical braces of steel buildings are typically selected as the energy-dissipating fuse element in the seismic load resisting system, while the diaphragm and other elements in the SLRS are designed to have a capacity that is equal to or exceeds the expected resistance of the braces (Fig. 1b). When tension-compression bracing is used, the steel bracing members designed for compression inherently possess significant reserve strength when loaded in tension, which means that large brace tension loads must be considered in the design of the surrounding protected structural components, including roof diaphragm systems. The 2005 National Building Code of Canada (NBCC) (NRCC, 2005) seismic provisions have led to the need for much thicker roof deck panels and more closely spaced diaphragm connection patterns compared with past practice, which is especially true in areas of high seismicity. Complying with these newly introduced design requirements

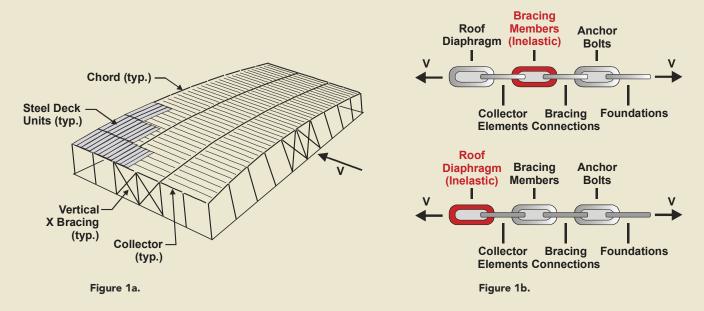


Colin A. Rogers is an associate professor of structural engineering at McGill University, Montreal, Canada.



Robert Tremblay is a professor of structural engineering and Canada Research Chair in Earthquake Engineering at École Polytechnique of Montreal, Canada.

This article has been excerpted from a paper to be presented at The Steel Conference, April 2-5 in Nashville, Tenn. Learn more about The Steel Conference at **www.aisc.org/nascc**. The complete paper will be available with the archived version of this article at **www.modernsteel.com/backissues**.



Single-story buildings with capacity-based design concepts for SLRS.

has significantly impacted the cost of steel building structures, making this system less attractive economically than in past years (Tremblay and Rogers, 2005).

This paper contains a description of the U.S. seismic design provisions for low-rise steel buildings, as well as a design example of a single-story building located in Boston. It also presents the interim findings of a study currently under way for which the objective is to develop seismic design strategies that account for the flexibility and ductility of the roof diaphragm in lowrise steel buildings. The scope of research includes quasi-static diaphragm shear tests (Tremblay et al., 2004; Essa et al., 2003), large-scale dynamic diaphragm tests (in progress), and ambient vibration building measurements (Paultre et al., 2004; Lamarche, 2005; Tremblay et al. 2008), as well as dynamic analyses of representative buildings (in progress). At project end, the aim is to make design recommendations, including: diaphragm stiffness under seismic loading, period of vibration for the building, seismic force modification factors, ductile detailing requirements, and inelastic performance levels.

#### **Conclusions**

Seismic provisions of modern building codes rely more and more on capacity design procedures to better control the inelastic "Current seismic provisions in the U.S. do not result in entirely consistent design between the steel framing and the diaphragms."

response of structures, providing a desired hierarchy of vielding in the structures. For braced steel frames, yielding is typically concentrated in the vertical system. Other components along the lateral load path, such as the roof diaphragm—including its chords and collectors-must be designed to resist the forces that will develop upon vielding in the vertical components of the seismic load resisting system. Current seismic provisions in the U.S. do not result in entirely consistent design between the steel framing and the diaphragms. If fullcapacity design principles were required, much higher design forces would need to be applied for diaphragms. For simple metal roof deck design, the example studied herein showed that the roof deck would need to be increased from 0.0295 in. to

0.0474 in. (22 ga to 18 ga) with a more closely spaced fastener arrangement. Alternative approaches can be studied to reduce the force demand. The designer can take advantage of the flexibility of the roof diaphragm, as this is currently permitted for the seismic retrofit of existing structures. Parametric studies performed in Canada have shown that there is a significant potential for savings if the period from dynamic analysis could be used in design. However, field test data seem not to match this data, and caution must be exercised before using the period prediction that accounts for roof diaphragm flexibility in seismic design. One other approach consists of allowing inelastic deformation in roof diaphragms. These deformations can develop in the form of bearing or tearing in the vicinity of the deck fasteners. Deformation capacity is limited, however, and means must be taken to ensure that they will be properly distributed over the diaphragm area so that no concentration will develop that can lead to complete failure of the diaphragm. Research projects have been undertaken to examine these two possibilities.

The references cited in this article are listed in the complete version of this paper, available online with the archived version of this article at www.modernsteel.com/backissues.

# Congratulations Walterio Lopez and Rafael Sabelli. Winners of the 2008 T.R. Higgins Lectureship Award for their groundbreaking paper "Seismic Design of Buckling Restrained Braced Frames."

"BRBFs have the potential to significantly impact the structural steel market in seismic regions,"

– Louis F. Geschwindner, AISC's vice president of Engineering and Research.







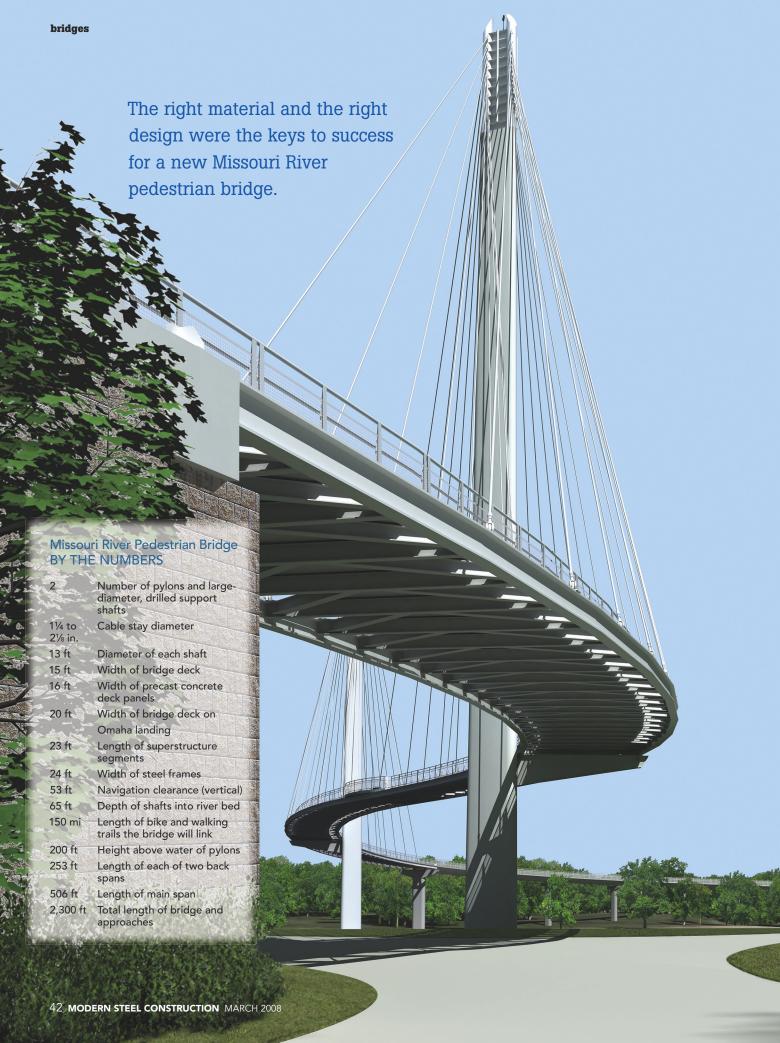


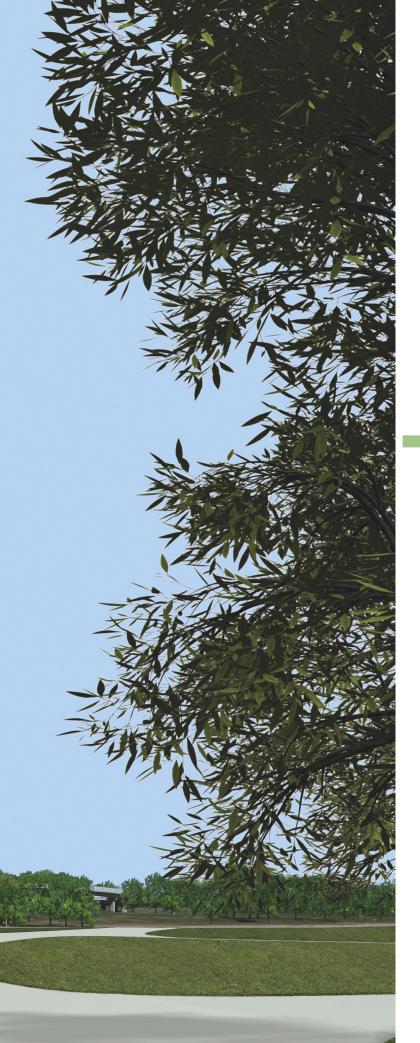


#### Simplicity. Performance. Economy.

Star Seismic's PowerCat<sup>™</sup> and WildCat<sup>™</sup> Buckling Restrained Brace systems are simply the best choice seismic system.







# Meandering Across the Missouri

BY CHRISTIAN BROWN, P.E.

#### THE MAN OF STEEL HAS AN UNCANNY ABILITY TO ARRIVE AT THE LAST MINUTE AND SAVE THE DAY.

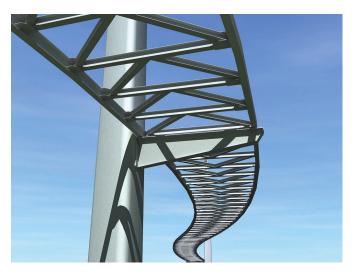
Though the situation in the Omaha, Neb.-Council Bluffs, Iowa metropolitan area was not so dramatic that it required the intervention of a superhero, the creative use of steel itself did provide a last-minute solution that enabled a signature span to move forward. As such, the Missouri River Pedestrian Bridge will cross the Missouri River and link these two cities when it opens this fall.

#### **STOP-AND-GO PROCESS**

Early in the process, the development puzzle was missing a significant piece: a way to deliver a design the city wanted at a price it could afford. The first request for proposal in 2004 asked for design-bid-build estimates for a curvilinear, cable-stayed bridge. The city was shocked when bids came in at twice the \$23 million budget. Officials decided to resubmit the RFP as a design-build project.

"It required a big leap of faith for us to consider another direction after the initial failure to get an acceptable bid," says Larry Foster, administrator of parks, recreation, and public properties for the city of Omaha and project manager for the bridge. "The easy route would have been to drop the project, but our mayor told us to find another way to get the bridge built—within budget."

HNTB Corporation had submitted a proposal under the initial RFP and continued to follow the process as it unfolded. For the second RFP response, the firm teamed with transportation construction firm APAC-Kansas, Inc. to submit a design-build bid, and was awarded a contract in 2006. Hans Hutton, lead designer at HNTB, was given free rein to select materials and design a span that would make a statement, and the design team knew the city preferred the curvilinear, cable-stayed structure. The challenge was to provide this design while staying within budget.





#### Steel to the Rescue

HNTB's final design for the bridge consists of a horizontally curved, cable-stayed bridge with a 506-ft main span and two 253-ft back spans. Two single-tower, three-sided pylons rise more than 200 ft above the river to complement the superstructure.

Instead of following a straight line, the superstructure meanders from one side of the first pylon to the opposite side of the second pylon in an "S" curve. The total bridge length, including approaches, is about 2,300 ft, resulting in one of the longest pedestrian bridges of its type in the world.

The ability to convert the Missouri River Pedestrian Bridge from a failed design-bid-build concept into a successful design-build project—while achieving the standout appearance the city wanted—can be summed up in a single word: steel.

"A concrete superstructure would have been much more expensive than the steel alternative," Hutton says. "We felt steel was the appropriate choice, given the style of bridge. We also felt that the steel, rolledbeam superstructure addresses the design challenges and makes an aesthetic statement. It has a nice look to it."

#### **Reduced Costs**

It would be difficult to overstate the cost advantages of using steel instead of concrete for this project. Steel saved money not only in building the superstructure, but also in reducing the need for temporary falsework.

The superstructure is being constructed using the balanced cantilever method, which lessens the need for falsework. Each 23-ft superstructure segment consists of a 24-ft-wide steel frame and a 16-ft-wide precast concrete deck panel. The gap between the edge girders and the deck is designed to enhance the performance of the bridge when subjected to wind loads.

Hutton has gone so far as to say that the final design would not have been economically feasible using any material other than the Grade 50 fracture-critical steel that was selected.

"The success of this project is directly related to the advantages that steel has over concrete," says Hutton. "Using steel significantly reduces the dead weight of the structure, reduces the projected area of the wind load, and minimizes the amount of falsework necessary, all of which significantly reduce the costs. Where concrete would have cost \$40 million, the steel alternative costs \$22 million. One could speculate that a concrete alternative could not have been built within the budget."

#### **Appealing Aesthetics**

Steel also helped designers create the clean, open look the city sought.

The bridge is set on a radius, and all dimensions are based on that radius. Although the bridge alignment is curved, the superstructure segments and precast deck panels are not. Instead, steel sections are straight-edged and identical in size and shape—with one side slightly longer than the other—and arranged to create the "S" curve.

The use of straight-piece sections is among the more innovative features of this project and couldn't have been achieved with any material other than rolled steel.

"Using straight pieces gave us a curvilinear shape that simplifies fabrication and also should help a great deal with erection," says Scott Gammon, vice president of APAC. "Being able to use standard rolled steel shapes gave us great latitude in developing the design and staying on budget."

Smaller detail, such as hand rails, pavement treatment, and lighting, will enhance the already striking design.

"A number of members of the arts com-

munity were on the selection panel, and they were very supportive of the light, attractive look of the APAC/HNTB proposal," says Foster. "Some proposals using materials other than steel appeared more massive and heavy. Because the HNTB design is narrower than the other proposals, it seems to be floating over the surface of the water."

Because much of the environmental work had been completed during the design-bid-build phase, APAC was able to begin construction quickly after the final design was approved. The bridge is expected to begin welcoming cyclists and walkers in November 2008.

When budget-busting estimates came in three years ago, no Caped Crusader was around to save the day. However, a strategic change in delivery method and building materials became the heroes that have led to an attractive bridge project that is set to meet its time and budget goals.

Christian Brown is a project manager with HNTB Corporation.

#### **Design-Build Team**

HNTB Corporation, Kansas City, Mo. APAC-Kansas, Inc., Kansas City, Kan.

#### **Construction Engineering**

Genesis Structures, Inc., Kansas City, Mo.

#### **Civil Design**

Schemmer Associates, Inc., Omaha, Neb.

#### **Construction Coordination**

Gregory A. Peterson Consulting, Inc., Omaha, Neb.

#### Steel Fabrication

DeLong's, Inc., Jefferson City, Mo. (AISC/NSBA Member)

#### **Bridge Cable**

CBSI, Inc., Houston



### **The Stability Continues**

Minimize construction time and maximize project cost savings. Wheeling Corrugating—the leader in innovation since 1890—is improving the market again! This time, we are proud to present two pioneering ways to save you money.

- Value Engineering—utilizing the highest tensile strength in the industry. Using our Super Bond composite floor deck products that span farther with a lighter gauge and UL heat-resistant paint a cost-saving alternative to galvanizing.
- Our brand new Seismic ShearLoc System—featuring the side-seam pneumatic fastening tool,
  "The Gator"—strong enough for seismic zones and
  so fast and easy to use you'll want it for every deck
  project. See our Web site for details.

With quality products and performance Wheeling Corrugating has the most experience and the most plants of any decking manufacturer in the country.



From the East to the West, even to Alaska, Wheeling Corrugating has become the trusted manufacturer on many projects including these:

Comcast Center

Mets Stadium

• 11 Times Square

• 353 N. Clark-40 floors

• 155 N. Wacker-48 floors

Sprint Center

• Lowes Distribution Center

• JL Tower

Philadelphia, PA

New York, NY

New York, NY

Chicago, IL

Chicago, IL

Kansas City, MO

Lebanon, OR

Anchorage, AK

It's pretty simple really. We're the company with a history of stability and a future of innovations and service. And that means value and savings for you!



1-877-333-0900 www.wheelingcorrugating.com







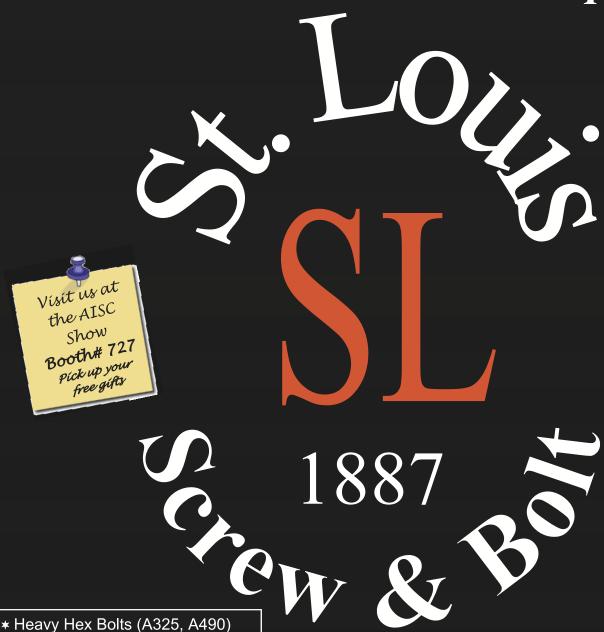






See us at booth #824 at the NASCC Show in Nashville.
The official booth of Robert's Western World.

## Buy Direct From a Manufacturer and an AISC Member Company



- **★** TC (Tension Control) Bolts
- **★ Low Carbon Bolts (A307)**
- \* Anchor Bolts (F1554 gr. 36,55,105 as well as A449, B7, Stainless
- \* Many Other Structural Fasteners





St. Louis Screw & Bolt

Email: sales@stlouisscrewbolt.com 2000 Access Blvd • Madison, IL 62060

Phone: 800-237-7059 Fax: 314-389-7510 Web: www.stlouisscrewbolt.com

# Campus Core

BY JIM CORSIGLIA, P.E., S.E.



A new cardiovascular facility is the heart of the University of Michigan's medical campus.



Photos: Douglas Steel Fabricating Corp.

#### EVERY YEAR, MICHIGAN FANS LOOK FORWARD TO FOOTBALL SEASON.

And they should, considering the Wolverines' success over the last century or so. This past fall, besides playing host to the 100,000-plus fans that descend upon the Ann Arbor campus for every home game, the University also welcomed a new building, the University of Michigan Cardiovascular Center (CVC).

The complexity of this 350,000-square-foot building took many shapes and forms. First of all, it's connected to existing buildings at five locations, as well as a new parking structure. The structural design also required careful coordination with the architectural design with respect to building massing and open space. From the connecting bridges and tunnels to a winter garden atrium, there were many opportunities for the design team to integrate structural and architectural design and highlight the structural aspects of the building.

#### **Site Conditions**

The grade surrounding the CVC varies around the perimeter. The CVC is in the center of the medical campus, surrounded on three sides by existing buildings and a new parking deck that was simultaneously built

on the fourth side. The site was so limited on space that workers parked in an off-site lot and were bused in.

With this limited site accessibility, there was an extremely small area for steel laydown. The fabricator elected to erect the building in thirds, using the area within the building's footprint for lay-down, and gradually emerging out of the basement excavation while erecting the steel. To create lay-down space, the slab on grade was partially installed prior to placing the columns. In order to provide access for column erection at a later date, larger-than-normal column box-outs in the slab were used.

#### **Tunnels**

The double-stacked tunnels that connect the CVC to adjacent buildings were constructed 65 ft below grade using internally braced earth-retention walls. Extreme care was taken during the excavation of the tunnels to maintain the integrity of the crossing utilities that remained in service during construction.

#### **Lateral Framing System**

The lateral framing for the east-west direction was provided by braces tucked in the duct and elevator shaft bays. Because the

braces were in close proximity to the floor openings, diaphragm capacity was poor. Collector links were used to channel the wind and seismic loads to the braces.

The lateral framing for the north-south direction stability was provided by two lines of braces supplemented with moment frames. The west face of the building is concave, and the lateral system was not practical on the building perimeter. The frame was placed one bay in, allowing for continuity of the exterior façade. The east frame line was located on the building perimeter, with the braces located at the stair shafts augmented by the moment frames to avoid interferences with the curtain wall visibility.

Just prior to the contract documents being released for bid, the on-site geotechnical engineers recommended changing the site classification from D to C, thus reducing the seismic design category from D to C. The reclassification to the soil site class was based on their observations during the basement excavation. The amount of fill and undesirable soil was less than expected from the original geotechnical investigation. In addition, the added basement shell space and footprint change contributed to the ability to reclassify the seismic design category. As such, the lateral framing system and supporting founda-



Connector bridges link the new building to the surrounding campus structures.

tion were reanalyzed, reducing the building tonnage by 150 tons, which simplified the lateral member connections and decreased the amount of reinforcing steel and concrete in the foundations.

#### **Exterior Envelope**

The exterior of the building utilizes three types of cladding: 12-in. precast sandwich panels, brick veneer with punched windows, and a curtain wall. The precast panel's gravity connections were supported with steel outriggers, minimizing embedded plates in the floor slab. The punched windows were 10 ft wide and required "goal posts" to transfer the lateral forces floor to floor. The three-story curtain wall required wind columns and horizontal spandrel beams. With all three systems, close coordination was required to ensure that the structural members were blended in the architectural design.

#### **Sensitive Equipment**

During the schematic phase, AISC's Steel Solutions Center assisted us with evaluating transient floor vibration behavior. They determined that the vibration velocity of 8,000 micro-inches per second could be achieved economically with steel, a conclu-

sion that was in line with our evaluation. During the fast-track design, the equipment selection was not complete, and the owner required the flexibility of either floor- or ceiling-mounted equipment. To provide this flexibility, the floor area above the sensitive equipment areas was also designed for the transient vibration requirements.

#### **Connector Link Bridges**

To maximize the university's needs and provide flexibility to move from one building to another, a series of bridges were designed. Three of the four bridges connect the CVC to existing buildings, and the bridge clear spans are in excess of 110 ft.

The sloping bridges span over fire access roads that had to remain open during construction. The overall depth of the bridges needed to remain as shallow as possible to accommodate the varying grades. Exposed tubular steel box trusses provided the necessary clearances, working in harmony with the architectural design and providing excellent horizontal and vertical load capacity.

Connecting new buildings to existing buildings is generally a design challenge, and the CVC situation was no exception. Two of the three building-to-building bridges inter-





The winter garden atrium's central connection ring (above) was shop fabricated.

The 60-ft-tall, 75-ft-diameter winter garden artrium (left) is a prominent visual feature of the CVC.

Round HSS tri-columns (visible at left and below) were used around the perimeter to support the façade and the roof structure.



sected existing building expansion joints. To maintain the structural integrity of the existing building structures, a combination of slide bearing plates and post-installed cantilevered beams were installed to support the connection portions for all of the new bridges.

#### **Parking Deck Bridge and Canopy**

The CVC is connected to a new cast-inplace, post-tensioned parking deck. The deck is built into the side of a hill, with the top level supporting sidewalks, landscaping, and a circular drop-off road.

The bridge from the CVC to the garage spans a permanent roadway that had to remain open during construction for material deliveries as well as fire truck access. The main supporting steel girder spans more than 60 ft, and the bridge was designed in two portions with an expansion joint separating them. Phased construction was extremely important in this area in order to balance the construction of two buildings while maintaining access via the road.

The bridge is covered by an architecturally exposed steel canopy that supports glass pan-

#### **AutoSD STEEL DETAILING**

Detailing the Future using AutoCAD® 14 - 2008, AutoCAD LT 2000 - 2008 and IntelliCAD®. For detailing structural and miscellaneous steel, roof frames, embeds, beams, columns, bracing, stairs, stair rails, wall rails, ramp rails, ladders, hip and valley, creating erection drawings and general editing using AISC or CISC shapes.

Beam to Beam, Beam to Column and Vertical brace to Column connection matching. Extract CNC data to DSTV files. Extract BOM for import into Fabtrol and E.J.E. material manager.

Five packages to choose from. Select the ones right for you.

Visit Our Website at www.autosd.com For more information or To download Free demo.



- \* No Maintenance Fees
- \* Free Technical Support
- \* Money Back Guarantee

#### AutoSD, Inc.

Meridian, MS 39305 8203 Lizelia Rd 601-679-5800 E-mail: ray@autosd.com

#### YOUR ENGINEERING **CONNECTION FOR** STEEL CONSTRUCTION



Phone: 281-260-9749

#### **Experienced Professional Engineers** Registered Nationwide!

We work with: Fabricators, Erectors, Detailers, **Architects & Building Owners** 

- Structural Steel Connection Design
- · Stair and Railing Design
- · Shop Drawing Review and Supervision
- Design Build Services
- Cold Formed Steel Design
- Curtain Wall Design
- Construction Dispute Resolution

SPECIALIZING IN CUSTOM STEEL CONNECTION DESIGNS

www.steelconnectiondesign.com

els, providing an inviting entrance. The north end of the canopy bears on W18 outriggers supported off of the CVC at each half bay by corresponding back span girders. The southern supports for the canopy are wide-flange columns on opposite sides of the expansion joint. The engineering to support the canopy included the differential lateral movement between the CVC and parking deck thermal loads. The two columns that bear on the parking deck were designed to be fixed at the canopy steel level and hinged at the parking deck support. The canopy girders and beams have clear spans in excess of 70 ft.

#### Winter Garden and Auditorium

One of the most prominent architectural features of the building is the winter garden atrium, a 60-ft-diameter, 75-ft-tall curtain wall façade open area that blends seamlessly into the building and interior floors. To achieve the greatest amount of open space, the use of round sections was selected. Architecturally exposed triangular vertical trusses (tri-columns) support the roof truss. Trees and plants were planted and designed to embrace the structural steel.

A large auditorium with a recessed floor is located in the middle of the building.

Transfer girders were designed to limit the column interference within the seating area, and topping and in-fill slabs were required to provide the non-linear appearance and stepped seating.

#### The Keys to Success

To maintain design efficiency and schedule, parallel cost estimates were performed during the schematic and design development phases by the construction manager and an independent estimating firm. Major adjustments were made after the schematic design, and only minor adjustments after the design development phase.

With the project being delivered on a fast-track schedule, the team decided that an architectural core and shell package would be issued with the structural steel. This allowed for complete coordination of the building's miscellaneous steel and eliminated the "phase construction" wasted efforts and money. Ultimately, this process lowered the owner's costs.

To maintain the architectural design intent, eccentric connections were designed for all of the truss members, with input from the fabricator. The eccentric connections allowed a 2-in. minimum gap between all faces (vertical, horizontal, and diagonal) for the bridges trusses and winter garden tri-columns. The additional space allowed for cleaner welds and a more visually pleasing architectural appearance.

During the bid/award phase of the project, the fabricator proposed changes to the bracing details to match its shop's expertise, a win-win situation for everyone. The building's structural integrity was maintained, the fabricator was able to reduce its costs, the speed of erection was increased, and in the end the owner saved money.

Jim Corsiglia is a structural engineer and associate with Harley Ellis Devereaux. He can be reached at jacorsiglia@hedev.com.

#### Architect

Shepley Bulfinch Richardson & Abbott, Boston

#### Structural Engineer

Harley Ellis Devereaux, Detroit

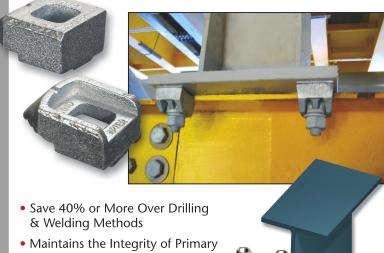
#### Steel Fabricator/Erector/Detailer

Douglas Steel Fabricating Corporation (AISC Member)

#### **Construction Manager**

Barton Malow, Southfield, Mich.





 Maintains the Integrity of Primary Steel & Protective Coatings

RDER CLAMP

 No Special Tools, Equipment or Site Power Needed

 Free Design Engineering of Your Connection by Lindapter Staff Engineers

 Pre-Engineered Clamps with Guaranteed Working Loads with 5:1 Safety Factor

 70+ Years of Experience with 3rd Party Approvals Gives Your Customer Peace of Mind

Visit us at Booth #1027 at the NASCC Convention.

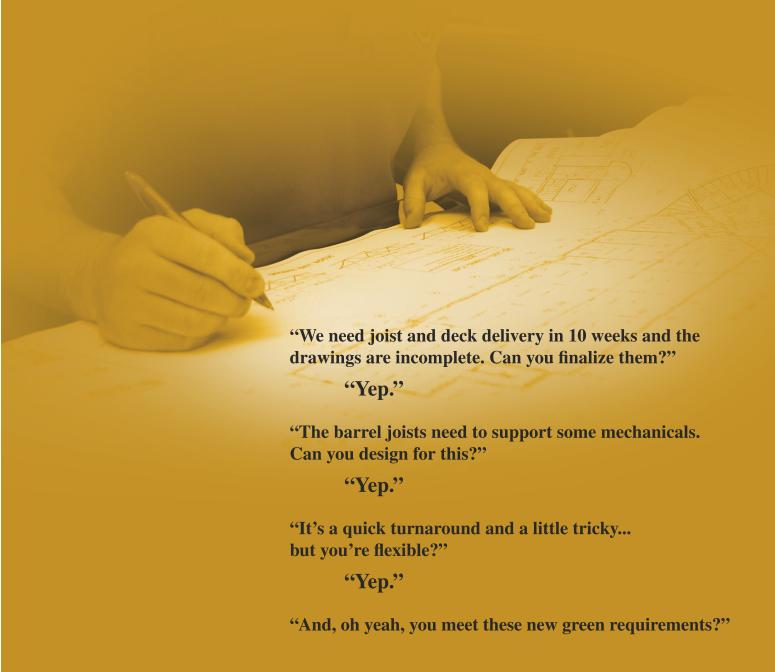
Call or e-mail for a full catalog.



(888) 724-2323

Email inquiries: gc-msc@lindapterna.com

www.lindapterna.com



## "Yep. You're golden."

Welcome to a very different conversation. One based on collaboration to ensure your joist and deck needs are met...every time. When you work with New Millennium what you'll hear is: What do you need? And when do you need it?

#### Challenge us. We'll help you keep your promises.

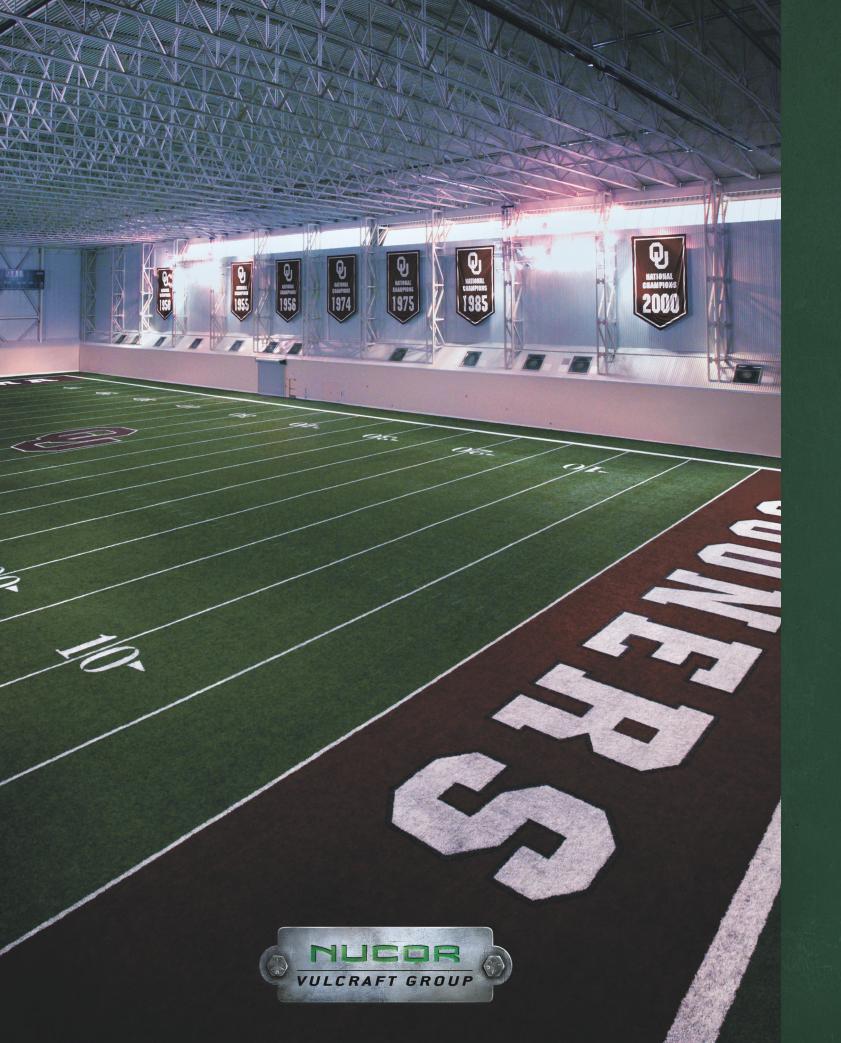
Whether it's detailing, tight deadlines or new green initiatives, we'll work closely with you to meet your project challenges and keep your customers happy. Because when your customers are golden, so are you.

See us at NASCC Booth #1212

Challenge us today at www.newmill.com/collaborate



Flexible to the Finish



# SOLID STEEL

HELPED STRENGTHEN F

# OKLAHOMA PIGSKIN.

Because Oklahoma weather is so volatile, the OU Sooners desperately needed an indoor practice facility. But the construction site was so small, there was no room to store the mammoth bowstring and long-span joists needed to support the building's roof. So when the Nucor Vulcraft Group was able to deliver the steel in precisely timed waves, we were able to help finish the project ahead of time. And give the Sooners the ability to practice through rain, sleet, snow and dark of night. 24/7 if need be. Sorry about that, guys.

It's Our Nature.



#### You Have Designed it. Fabrication is Complete. Now Protect it!

Today's marketplace demands that valuable steel products last longer than ever before. Protect your reputation: deliver a preferred, value-added product to your quality-conscious customers with the help of America's largest galvanizer.

Aztec's expertly applied hot-dip galvanizing creates a protective zinc barrier to the surface of steel assuring decades of protection from costly maintenance, downtime and system failures.

As always, Aztec is fully committed to protecting the environment. Thirty percent of our zinc inventories are produced from recycled zinc. Please visit our website to learn which of our 14 locations can serve you!































www.azz.com

# \$ave More Money

BY CHARLES J. CARTER, P.E., S.E., AND THOMAS J. SCHLAFLY

Smart design and detailing can add up to big savings in the total cost of fabricated structural steel.

WHEN A STEEL FABRICATOR prepares a cost estimate for a typical project, the following steps are common:

- ✓ Perform a detailed material and labor takeoff.
- Weigh and price all materials, including waste materials, for which payment is based upon weight, such as structural shapes, plates, and bolting products.
- ✓ Add the cost of supplemental materials for which payment is not based upon weight, such as welding and painting products.
- ✓ Estimate the labor hours required to fabricate the project and calculate the cost, including overhead.
- ✓ Add the cost of all outside services required, such as prefabrication materials preparation, galvanizing, shipping, and erection.
- ✓ Add the cost of shop drawings.
- Add the cost of buyout items such as steel deck and steel joists.
- Evaluate the risk and need for contingency, bonding, and insurance requirements and add the appropriate amount.
- ✓ Factor in schedule requirements and add the appropriate amount.
- Determine the profit required and add the appropriate amount.

All of the components of the total cost identified in the foregoing estimating process can be classified into one of four categories:

Material costs: This category includes the structural shapes, plates, steel joists, steel deck, bolting products, welding products, painting products, and any other products that must be purchased and incorporated into the work. It also includes the waste materials, such as short lengths of beams (called "drops") that result when beams are cut to the specified length. By an order of magnitude, the most influential component of these products on the total material cost of a building structure is the weight of the structural shapes. Also of impact is how much material can be purchased in mill-order quantities directly from a mill and how much must be purchased in smaller quantities through a steel service center.

As illustrated in the chart (next page), the typical material cost has rebounded in recent years from its low of 20% of the total cost in 1998. Nonetheless, the current percentage remains one-third lower than 25 years ago.

**Fabrication labor costs:** This category includes the detailing and fabrication labor required to prepare and assemble the shop assemblies of structural shapes, plates, bolts, welds and other materials and products for shipment and subsequent erection in the field. It also includes the labor associated with shop painting. The total fabrication labor cost is simply the cost of the detailing and shop time required to prepare and assemble these components, including overhead and profit.

The typical fabrication labor cost has increased slightly in recent years from 30% of the total cost in 1983 to 33% in 2008. This represents a 10% increase in fabrication labor costs over the last 25 years.

**Erection labor costs:** This category includes the erection labor required to unload, lift, place and connect the components of the structural steel frame. The total erection labor cost is simply the cost of the field time required to assemble the structure, including overhead and profit.

The typical erection labor cost has increased in recent years from 19% of the total cost in 1983 to 27% in 2008. This represents a 42% increase in erection labor costs over the last 25 years.

Other costs: This catch-all category includes all cost items not specifically included in the three foregoing categories: outside services other than erection, the additional costs associated with risk, the need for contingency, and the schedule requirements of the project.

The typical cost in this category has increased slightly in recent years from 11% of the total cost in 1983 to 13% in 2008. This represents an 18% increase in other costs over the last 25 years.

Obviously, very few projects, designers, fabricators, and erectors are exactly alike. Given this, the exact distribution of the total cost among

This article was updated from a previous version written by Carter, along with Thomas M. Murray, P.E., Ph.D., and William A. Thornton, P.E., Ph.D. in April 2000.

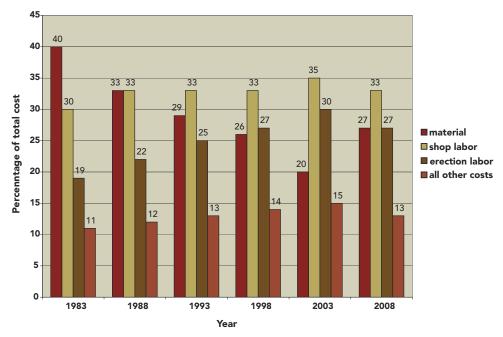


Figure 1. Material, shop labor, erection labor, and other costs—1983 through 2008.

these four categories can and will vary based upon the specific characteristics of a given project, including the design and construction team. In some specialized cases, any one of the four cost centers may dominate the total cost. Nonetheless, it can be stated that the current distribution of cost, rounded to the nearest 5% increment, among these four centers for a typical structural steel building is approximately as follows:

**Cost Conclusion:** Thus, in today's market, labor in the form of fabrication



and erection operations typically accounts for approximately 60% of the total constructed cost. In contrast, material costs only account for approximately one quarter of the total constructed cost. Clearly then, least weight does not mean least cost. Instead, project economy is maximized when the design is configured to simplify the labor associated with fabrication and erection.

#### **Ways to Save Time and Money**

Given these factors, the following are basic suggestions that you can use in your office practice today to work smarter—and to improve the economy of steel building construction.

Communicate! With the division of responsibilities for design, fabrication, and erection that is normal in current U.S. practice, open communication between the engineer, fabricator, erector, and other parties in the project is the key to achieving economy. In this way, the expertise of each party in the process can be employed at a time when it is still possible to implement economical ideas. The sharing of ideas and expertise is the key to a successful project. Indeed, the Construction Industry Institute (CII) has noted that the earlier construction design decisions are made, the more money those decisions can save.

Take advantage of a pre-bid conference. When in doubt about a framing detail or construction practice, consult a knowledgeable fabricator and/or erector. Most will gladly make themselves available at any stage of the game for a pre-bid conference, such as to help with preliminary planning or discuss acceptable and economical fabrication and erection practices. A pre-bid conference can also be used to communicate the requirements and intent of the project to avoid misunderstandings that can be costly. Many times, fabricators and erectors can provide valid cost-saving suggestions that, if entertained, can reduce cost without sacrificing quality.

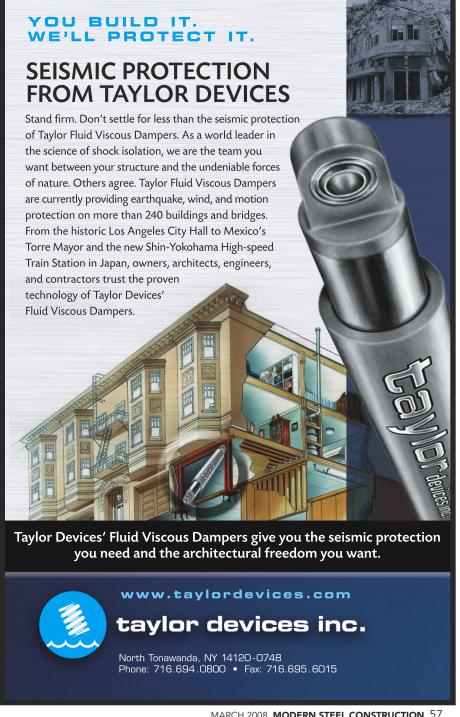
Issue complete contract documents when possible. Design drawings and specifications are the means by which the owner, architect, and/or engineer communicates the requirements for structural steel framing to the fabricator and erector. Care in preparing these and other contract documents is important, not only to assure responsive bids or estimates, but also to minimize the potential for misrepresentation, errors and omissions in both bidding and the final product. The most clear, complete, and accurate design drawings and

specifications will generally net the most accurate and competitive bids. Certainly, they are the starting point for economical, timely construction in steel. For guidance on what constitutes complete contract documents, consult the AISC Code of Standard Practice, particularly Section 3, (www.aisc. org/code) and CASE 962D, A Guideline Addressing Coordination and Completeness of Structural Construction Documents. When the nature of the project is such that it is not possible to issue complete contract documents at the time of bidding, clearly provide the scope and nature of the work

as far as what the framing will be and what kinds of connections are required.

Don't forget to include the basics. Show a North arrow on each plan. Show a column schedule. Include "General Notes" that cover the requirements for painting. connections, fasteners, etc. in a manner that is consistent, complementary, and supplementary to the specification.

Late details can cost a lot. Even simple detail items like roof- or floor-opening frames can cost a small fortune if delayed, particularly when the delay forces installation after the steel deck is in place. Check



the real costs the next time an opening frame gets moved, and then ask what the original detail costs to fabricate and install. You'll be amazed at the ratio of these numbers.

Show all the structural steel on the structural design drawings. As indicated in the AISC Code of Standard Practice, structural steel items should be shown and sized on the structural design drawings. The architectural, electrical, and mechanical drawings can be used as a supplement to the structural design drawings, such as by direct reference to illustrate the detailed configuration of the steel framing, but the

quantities and sizes should be clearly indicated on the structural design drawings.

Make sure the general contractor or construction manager clearly defines responsibilities for non-structural and miscellaneous steel items. Structural and non-structural steel items are identified in AISC Code of Standard Practice Section 2. Many items, such as loose lintels, masonry anchors, elevator framing, and precast panel supports, could be provided by more than one subcontractor. Avoid the inclusion of such items in two bids by clearly defining who is to provide them.

Avoid "catch-all" specification language. Language like "fabricate and erect all steel shown or implied that is necessary to complete the steel framework" probably sounds good to a lawyer, but it really does not add much to quality or economy, because it is nebulous and ambiguous. What is implied? Such language probably results only in arguments, contingency dollars, or change orders—and legal fees.

Avoid language that is subject to interpretation. Vague notations, such as "provide lintels as required," "in a workman-like manner," "standard," and "to the satisfaction of the engineer" are subject to widely varying interpretations. Instead, when required, specify measurable performance criteria that must be met.

Use standard practices and tolerances. ASTM A6/A6M defines standard mill practice. The AISC Code of Standard Practice defines fabrication and erection tolerances. The RCSC Specification for Structural Joints Using ASTM A325 or A490 Bolts (www.boltcouncil.org) covers bolting acceptance criteria. AWS D1.1 establishes weld acceptance criteria. These and other documents provide standard tolerances that are acceptable for the majority of cases. Generally, they present the most efficient practices. Practices common to the industry work in a context and with the infrastructure routinely available in building construction.

In some cases, more restrictive tolerances may be contemplated for compatibility with the systems and materials that are supported by the structural steel frame. Or, tolerances may need to be defined for highly specialized systems or when steel and concrete systems are mated. All non-standard practices should be cost justified.

Changes in practices and tolerances require planning and resources that are not common and cause disproportionate increases in time and cost. Changes in tolerances, if made, need to reflect common construction practices and the available workpoints.

Clearly state any inspection requirements in the contract documents. The scope and type of inspection of structural steel should be indicated in the project specification. Make sure that the requirements for inspection are appropriate for the application. For example, the inspection of groove welds that will always be in compression during their service life is probably not required. Also, make sure shop inspection is scheduled so that it does not disrupt the normal fabrication process.

# Ficep with "Wireless Technology" Now Offers the Fastest Single Spindle Drill Line on the



That's right! Ficep has pushed the technology and performance level of single spindle drills to a new level by incorporating many proven technological features that are part of their multiple spindle CNC drilling lines. Some of the productivity features that are now part of the new Victory 11 are:

◆ Positive ball screw spindle feed to use carbide tools for unbelievable feed rates.

- ◆ 2,000 RPM spindle speed.
- Wireless remote control enhances floor-to-floor productivity by 30%.

**Market Today!** 

- ◆ Self contained design eliminates the need for trailing cables, wires, hoses, etc.
- ◆ Integrated chip collection system.

#### All this and more at an extremely attractive price!

Give us a call to find out how you can substantially reduce your man hours per ton for an investment equal to the **annual cost of one employee**.



Visit us at NASCC Booth 108 2301 Industry Court Forest Hill, Maryland 21050 410-588-5800 • 410-588-5900 fax www.ficepcorp.com Avoid the use of brand names when specifying common products. When many manufacturers make a product, or there are acceptably equivalent products, avoid specifying the product by brand name. When it is necessary to indicate a brand name for the purposes of description, be sure it is a current, readily available product. Whenever possible, allow the substitution of an "equal." One excellent example: paint.

Try to avoid them entirely, but when you can't, clearly identify changes and revisions. Changes and revisions that are issued after the date of the contract generally have some cost associated with them. For example, material may have already been ordered, shop drawings may have already been drawn, and shipping pieces may have already been fabricated. Thus, it is best to avoid a default reliance on the change and revision process as a means to expedite schedules. However, when changes or revisions are necessary or desirable, they should be clearly identified so that all parties can recognize them and account for them.

Provide meaningful and responsive answers to requests for information. When the fabricator asks for a design clarification through an RFI, the most prompt and complete response, within the limitations of the available information, will be beneficial to all parties. If the RFI involves information on a shop drawing approval submission, it is best to provide the most specific answer possible. Try to avoid responses such as "architect to supply," "general contractor to supply," or "verify in field."

Specify materials in the appropriate—and usual—grade. See Part 2 of the 13th edition AISC *Steel Construction Manual* (available at www.aisc.org/bookstore) for a guide to the appropriate and usual grades for all the various structural steel materials.

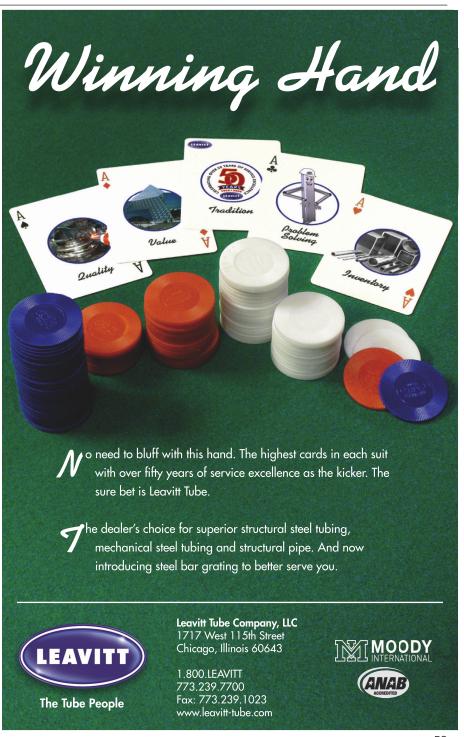
Consider the use of hollow structural sections (HSS). Square and rectangular HSS are available in ASTM A500 grades B and C with 46 ksi and 50 ksi yield strengths, respectively. Round HSS are available in ASTM A500 grades B and C with 42 ksi and 46 ksi yield strengths, respectively. Although their material cost is generally higher, HSS generally have less surface area to paint or fireproof (if required), excellent weak-axis flexural and compressive strength, and excellent torsional resistance when compared with wide-flange cross-sections.

Be careful when specifying beam

camber. Don't specify a camber of less than ¾ in.; small camber ordinates are impractical, and a little added steel weight may be more economical anyway. Also, do not overspecify camber. Deflection calculations are approximate and the actual end restraint provided by simple shear connections tends to lessen the camber requirement. Consider specifying from two-thirds to three-quarters of the calculated camber requirement for beams spanning from 20 ft to 40 ft, respectively, to account for connection and system restraint. In any case, watch out when rounding up the calculated.

lated camber ordinate, particularly with composite designs. Shear studs are unforgiving in that they can protrude through the top of the slab when too little camber is relieved under the actual load. Alternatively, allow sufficient slab thickness to account for reduced actual deflection.

Another thing to keep in mind: The minimum length of a beam that is to be cambered is about 25 ft. Why? Because the fabrication jig that is used to camber beams is usually configured with pivot restraints that hold the beam from 18 ft to 20 ft apart. To make sure there is adequate beam extend-



ing beyond this point to resist the concentrated force from the cambering operation, a 25-ft beam is generally required.

Favor the use of partially composite action in beam design. Although shear stud installation costs vary widely by region, one installed shear stud, on average, equates to 10 lb of steel. Fully composite designs are not usually the most economical, because the average weight savings per stud is less than 10 lb. Sometimes, the average weight savings per stud for 50% to 75% composite beams can exceed the point of equivalency. In some cases, non-

composite construction can be most economical. A caveat: Make sure that the beam in a composite design is adequate to carry the weight of the wet concrete.

When composite construction is specified, the size, spacing, quantity and pattern of placement of shear stud connectors should be specified. It should also be compatible with the type and orientation of the steel deck used.

When evaluating the relative economy of composite construction, keep in mind that most shear stud connector installers charge a minimum daily fee. So, unless there are enough shear stud connectors on a job to warrant at least a day's work, it may be more economical to specify a heavier non-composite beam.

Shear stud connectors should be field installed, not shop installed. Otherwise, they are a tripping hazard for the erector's personnel on the walking surface of steel beams.

Consider cantilevered construction for roofs and one-story structures. Cantilevered construction was invented primarily to reduce the weight of steel required to frame a roof. Although today we are less concerned with weight savings than labor savings, cantilevered construction may still be a good option. Why? Because the associated connections of the members are generally simple to fabricate and fast and safe to erect. So cantilevered construction is still very much a potential way to save money.

Use rolled-beam framing in areas that will support mechanical equipment. It always happens. The structural design is performed based upon a preliminary estimate of the loads from the mechanical systems and units. Later, the mechanical equipment is changed and the loads go up—way up—sometimes after construction has begun. Rolled-beam framing offers much greater flexibility than other alternatives to accommodate these changing design loads.

Optimize bay sizes. It is still a good idea to design initially for strength and deflection. Subsequently, geometry and compatibility can be evaluated at connections, with shape selections modified as necessary. John Ruddy's assessment in a 3rd Quarter 1983 AISC *Engineering Journal* paper (www.aisc.org/epubs) suggested that using a bay length of 1.25 to 1.5 times the width, a bay area of about 1,000 sq. ft, and filler beams spanning the long direction combine to maintain economical framing. But...

Avoid shallow beam depths that require reinforcement or added detail material at end connections. Detail material such as reinforcement plates at copes and haunching to accommodate deeper, special connections is typically far more expensive than simply selecting a deeper member that can be connected more cleanly. If the beam is changed from a W16×50 to a W18×50, the simplified connection is attained virtually for free. And...

Don't change member size frequently just because a smaller or lighter shape can be used. Detailing, inventory control, fabrication, and erection are all



simplified with repetition and uniformity. Keep in mind that economy is generally synonymous with the fewest number of different pieces. This same idea applies when selecting the chords and web members in fabricated trusses.

Select members with favorable geometries. Watch out for connections at changes in floor elevations; a deeper girder may simplify the connection detail. Also, watch out for W10, W8, and W6 columns, which can have narrow flanges and web depth; connecting to either axis is constrained and difficult. It is often most helpful to make rough sketches of members to approximate scale in their relative positions to discover geometric incompatibilities.

Use repetitive plate thicknesses throughout the various detail materials in a project. Just like with member sizing, the use of similar plate thickness throughout the job is generally more economical than changing thicknesses just because you can. For example, use one or two plate thicknesses for all the column base plates. This same idea applies for other detail materials such as transverse stiffeners and web doubler plates.

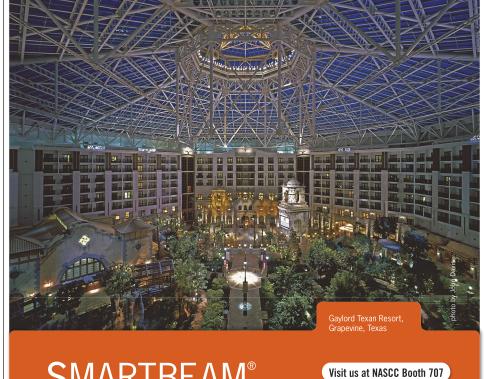
Design floor framing to minimize the perceptibility of vibrations. Floor vibration can be an unintended result in service when floors are designed only for strength and deflection limit-states and an absoluteminimum-weight system is chosen. Today's lighter construction, when combined with the lack of damping due to partitionless open office plans and light actual floor loadings (in the era of the nearly paperless office), has exacerbated the potential for floor vibration problems. Fortunately, design criteria to prevent perceptible floor vibrations from occurring are available; see AISC's Design Guide No. 11 (www.aisc.org/ epubs). There is also a helpful guide article by Christopher Hewitt and Thomas Murray in the April 2004 issue of MSC (www. modernsteel.com/backissues).

When designing for snow-drift loading, decrease beam spacing as the framing approaches the bottom of a parapet wall. Reduced beam spacing allows the same deck size to be used and the same beam size to be repeated into a parapet against which snow may drift. This is generally more economical than maintaining the same spacing and changing the deck and beam sizes.

Minimize the need for stiffening. When required at locations of concentrated flange forces, transverse stiffeners and web doubler plates are labor-intensive detail

materials. For the sake of economy, using 50 ksi steel and/or a member with a thicker flange or web can often eliminate them. In the latter case, consider trading some less expensive member weight for reduced labor requirements. Always remember to reduce the panel-zone web shear force by the magnitude of the story shear. This can often mean the difference between having to use a web doubler plate and not. For further information, see AISC Design Guide No. 13 (www.aisc.org/epubs).

Economize web penetrations to minimize or eliminate stiffening. Web penetrations in beams are often a cost-effective means of minimizing the depth of a floor system that contains mechanical or electrical ductwork. However, if they are numerous and require stiffening, it is probably more economical to eliminate them and pass all ductwork below the beams, if possible. Thus, stiffening at web penetrations should be called for only if required. The use of a heavier beam, a relocated opening, a change in the size of the opening, and the use of current design procedures can often eliminate the need for reinforcement of beam web penetrations. If web pen-



**SMARTBEAM®** 

"SMARTBEAM" provided the perfect balance between the light transmission and load/deflection characteristics we were looking for. It was a perfect fit for our project."

—Rick Gardner, Architect of Record, Hnedak Bobo Group

Ideal for long span projects, SMARTBEAM® from CMC Steel Products is 50% lighter than traditional steel framing making it an innovative alternative to other systems. There is no added cost to incorporate services with SMARTBEAM's® unique column free design. SMARTBEAM® is the right choice for long span roof structures—don't take our word for it...



Take it from the people who count—the professionals using it.



etrations are to be used and stiffening is required, the most efficient and economical detail is the use of longitudinal stiffeners above and below the opening. For more information, see AISC Design Guide No. 2 (www.aisc.org/epubs).

Eliminate column splices, if feasible. On average, the labor involved in making a column splice equates to about 500 lb of steel. Consider the elimination of a column splice if the resulting longer column shaft remains shippable and erectable. If a column is spliced, locating the splice at 4 ft to 5 ft above the floor will permit the

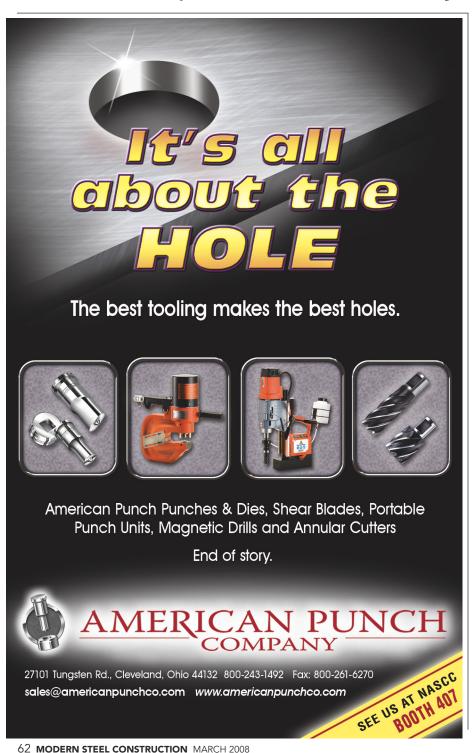
attachment of safety cables directly to the column shaft, where needed. It will also allow the assembly of the column splice without the need for scaffolding or other accessibility equipment. If the column splice design requires welding in order to attain continuity, consider the use of PJP groove welds rather than CJP groove welds for economy.

Configure column base details that are erectable without the need for guying. Use a four-rod pattern, base-plate thickness, and an attachment between column and base that can withstand gravity and wind loads during erection. At the same time, make sure the footing detail is also adequate against overturning due to loads during erection. For further information, see AISC Design Guide No. 10 (www. aisc.org/epubs). This reference contains minimum column base details for various column heights, and recommended wind exposures. And...

Make your column base details repetitive too. The possibility of foundation errors will be reduced when repetitive anchor-rod and base-plate details are used. Keep your anchor-rod spacings uniform throughout the job. Use headed rods or rods that have been threaded with a nut at the bottom if there is any calculated uplift. Otherwise, hooked rods can also be used if desired. Be sure to identify both the length of the shaft and the hook if so.

Allow the use of the right columnbase leveling method for the job. Three methods are commonly used to level column bases: leveling plates, leveling nuts and washers, and shim stacks and wedges. Regional practices and preferences vary. However, the following comments can be stated in general: Leveling plates lend themselves well to small- to medium-sized column bases, say, up to 24 in. Shim stacks and wedges, if used properly, can be used on a wide variety of base sizes. Proper use means maintaining a small aspect ratio on the shim stack, possibly tack welding the various plies of the shim stacks to prevent relative movement and secure placement of the devices to prevent inadvertent displacement during erection operations and when load is applied. Leveling nuts and washers lend themselves well to mediumsized base plates, say, 24 in. to 36 in., but are only practical when the four-rod pattern of anchor rods is spaced to develop satisfactory moment resistance. Large column base plates, say, over 36 in., can become so heavy that they must be shipped independently of the columns and preset, in which case grout holes and special leveling devices are usually required.

Don't over-specify the details of secondary members. For example, spandrel kickers and diagonal braces can often be provided as square or bevel-cut elements that get welded into the braced member and structural element that provides the bracing resistance with a very simple line of fillet weld. In contrast, it is very costly to require that such secondary details be miter-cut to fit the profile of a member or element to which it is connected and welded all-around.

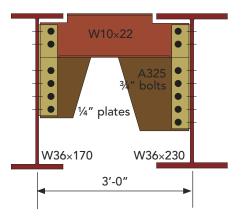


Keep relieving angles in a practical size range. The thickness of relieving angles is normally 5/16 in. or 3/8 in. If a greater thickness is required for strength, the basic design assumptions should be reviewed and perhaps modified. If vertical and/or horizontal adjustment of masonry relieving angles is required, the amount of adjustment desired should be specified and the fabricator should be allowed to select the method to achieve this adjustment, such as by slotting or shimming. Final adjustments to locate relieving angles should be made by the mason, preferably after dead load deflection of the spandrel member occurs.

Consider if heavy hot-rolled shapes are really necessary in lighter and miscellaneous applications. Ordinary roof openings can usually be framed with angles rather than W-shapes or channels. As another example, heavy rolled angles for the concrete floor slab stop (screed angles) are unnecessary if a lighter gage-metal angle will suffice (something in the 10-gage to 18-gage range, depending upon slab thickness and overhang). These lighter angles can often be supplied with the steel deck and installed with puddle welding, simplifying the fabrication of the structural steel. Small roof openings on the order of 12 sq. in. or less probably need not be framed at all unless there is a heavy suspended load, such as a leader pipe.

Consider the fabricator's and erector's suggestions regarding connections. To a large extent, the economy of a structural steel frame depends upon the difficulty involved in the fabrication and erection, which is a direct function of the connections. The fabricator and erector are normally in the best position to identify and evaluate all the criteria that must be considered when selecting and detailing the optimum connection, including such non-structural considerations as equipment limitations, personnel capabilities, season of erection, weight, length limitations, and width limitations. The fabricator will also know when variations in bolt diameters and holes sizes, broken gages, and a combination of bolting and welding on the same shipping piece will incur excessive and costly material handling requirements in the shop.

Design connections for actual forces. Or at least do not overspecify the design criteria. In U.S. practice, the Engineer of Record sometimes specifies standard reactions for use by the connection designer. These standard reactions can sometimes be quite conservative: look at the extreme exam-



ple illustrated in the above figure. However, design for the actual forces generally allows more widespread use of typical connections, which improves economy. Axial forces, shears, moments, and other forces should be shown as applicable so that proper connections can be made and costly overdesign, as well as dangerous underdesign, can be avoided. This applies to shear connections, moment connections, bracing connections, column splices—all connections! The actual reactions are quite important for the proper design of end connections for beams in composite construction.

Use one-sided shear connections when possible. One-sided connections, such as single-plates and single-angles, have well-defined performance, are economical to fabricate, and are safe to erect in virtually all configurations. When combined with reasonable end-reaction requirements, one-sided connections can be used quite extensively to simplify construction. Sometimes, however, end reactions are large enough to preclude their use because of the strength limitations of such connections.

Avoid through-plates on HSS columns; use single-plate shear connections whenever possible. A single-plate connection can be welded directly to the column face in all cases where punching shear does not control and the HSS is not a slender-element cross-section.

Design columns to eliminate web doubler plates (especially) and transverse stiffeners (when possible) at moment connections. The elimination of labor-intensive items such as web doubler plates and stiffeners is a boon to economy. One fillet-welded doubler plate can generally be equated to about 300 lb of steel; one pair of fillet welded stiffeners can generally be equated to about 200 lb of steel. Additionally, their elimination simplifies weak-axis framing. For further information, see AISC Design Guide No. 13 (www.aisc.org/epubs).

## HELP IS HERE.

Get the 75-year Steel Joist Manual, the current Specs and Loads Catalog and comprehensive technical digests on steel joist construction at steeljoist.org/help

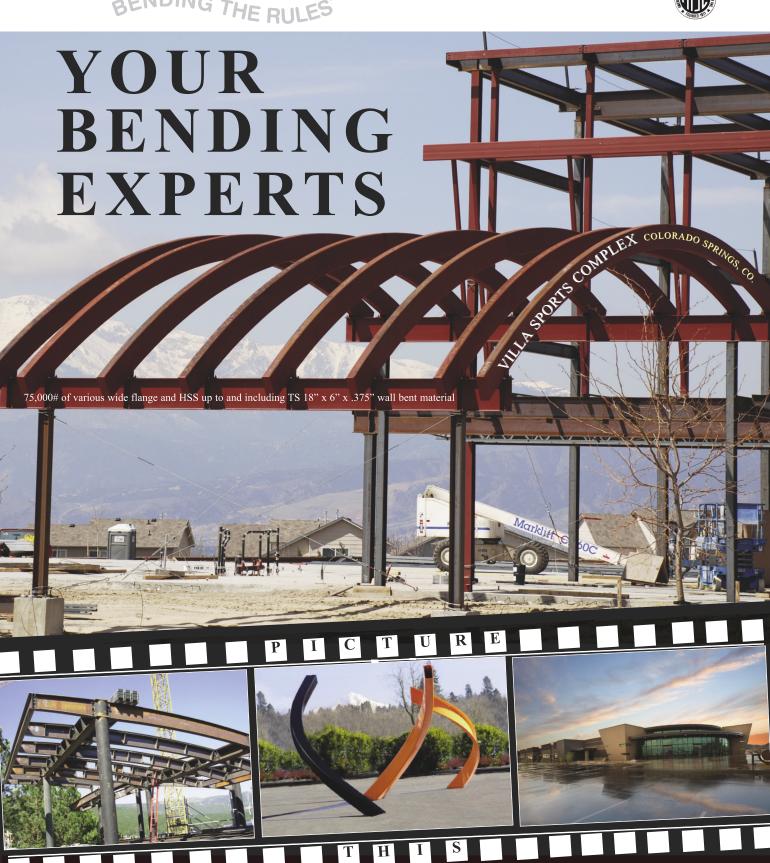


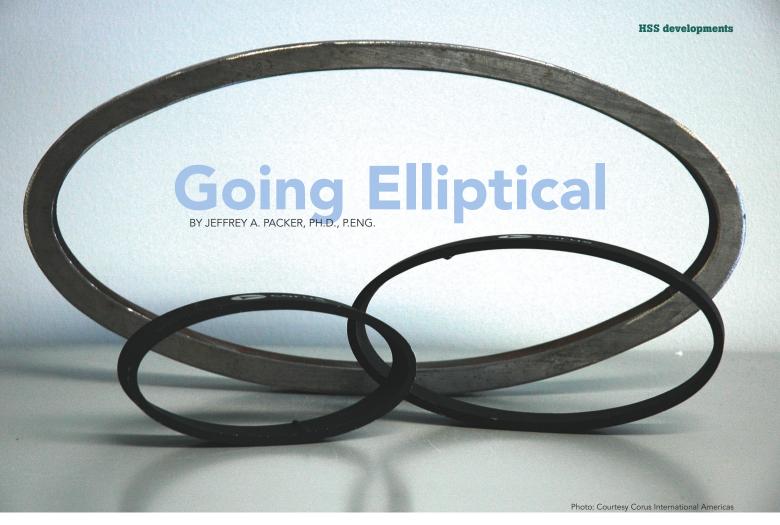


BENDING THE RULES

12080 SW Myslony St. Tualatin, OR 97062 Toll-Free: (866) 252-4628 info@albinapipebending.com www.albinapipebending.com







## Elliptical hollow sections are making inroads in North America, and experts worldwide are making efforts to promote this latest of HSS types.

**LIKE ANY OTHER FAMILY,** the hollow structural section family has grown over the years. It began with circular shapes, and then expanded to square and rectangular sections.

The newest member is the elliptical hollow section (EHS). It was introduced in France in 1994 by Tubeurop (which has since become a part of Arcelor Tubes, which in turn has since become a part of Condesa), along with its companion section, semi-elliptical (D-shaped). These shapes are now produced by other companies as well, including Corus in the UK—under the label Celsius 355 Ovals—and Ancofer Stahlhandel GmbH (Germany).

#### **Gaining Momentum**

The elliptical product has grown progressively in stature, with architects employing these sections in numerous structures with exposed steelwork for aesthetic purposes. EHS have greater bending capacity than circular hollow sections (CHS) of the same area or weight, due to having strong and weak axis directions, but still maintain a smooth closed shape. There is also reduced visual intrusion compared to CHS, if the member is viewed from one common direction. The principal application of EHS has been as structural supporting members for glass roofs and glass façades. Other applications include columns, electricity transmission line pylons, pedestrian bridges, and wind turbine masts.

Examples of all of these applications are spread across Europe, but the shape has made the trip across the Atlantic as well. In Can-

ada, EHS columns have already been employed in two structures, both of which have won design awards: the skylight of the Electronic Arts stair in Vancouver and the Legends Centre in Oshawa, Ontario.

EHS are produced, with major-to-minor outside dimensions of 2:1, as hot-formed hollow structural sections to EN 10210 (CEN 2006a, 2006b). They are commonly available in the grade S355J2H, which has a minimum yield strength of 355 MPa (about 50 ksi) up

to 16 mm (0.63 in.) wall thickness and a Charpy impact resistance of 27 Joules at -20 °C.

Being manufactured only via the hot-finishing process, EHS thus meet CAN/CSA-G40.20-04/G40.21-04 (2004) Class H or ASTM A501 (2001) in North America. Hence, they inherently have minimal residual stresses, excellent welding capability, and inherent toughness. As a mark of their acceptance into the community of structural sections, the most recent (2006) European production standard for hot-formed structural hollow sections (CEN 2006a,



Jeffrey A. Packer is a professor at the University of Toronto.



This test sample of an EHS failed by local buckling.

2006b) includes EHS in the scope, with formulae for section properties and calculated values for EHS ranging from 120 mm by 60 mm by 3.2 mm (4.75 in. by 2.36 in. by 0.125 in. ) to 500 mm by 250 mm by 16.0 mm (19.7 in. by 10 in. by 0.63 in.). As for other hollow sections produced to EN 10210, there is a -10% tolerance on thickness and a  $\pm 6\%$  tolerance on mass. The outside dimension tolerance is  $\pm 1\%$ , with a minimum of  $\pm 0.5$  mm (0.02 in.), except this tolerance may be doubled for EHS with a major axis dimension less than 250 mm (10 in.).

Such noncorporate publication of mechanical and geometric properties will serve to increase the market and utilization of EHS. However, their use has been hindered by a lack of other structural engineering design guidance—in particular, section classification information. This very fundamental deficiency has recently been tackled in the UK. On the basis of experimental and numerical (finite element) studies at Imperial College, London, and University of Southampton, experts L. Gardner, T.M. Chan, and A. Ministro have classified EHS into Classes 1,2,3 and 4 (per Eurocode 3, CEN 2005) with limiting wall slenderness ratios for various aspect ratios. Their system for cross-section classification covered all loading cases: axial compression, bending about both principal axes, and combined compression plus bending. The Eurocode 3 class limits for CHS were shown to be applicable to EHS, but using new proposed cross-section slenderness parameters with an EHS "effective diameter,"  $D_e$ , defined by:

 $D_e = 2(a^2/b)$  for axial compression and minor axis bending (Equation 1), and  $D_e = 1.3(a^2/b)$  for major axis bending, with aspect ratios of 2:1 (Equation 2)

#### where

- a = half the larger EHS dimension
- b = half the smaller EHS dimension

Y. Zhu and T. Wilkinson in Australia also independently proposed Equation 1 for the load case of axial compression, based on finite element models calibrated against EHS stub column tests performed in Canada. Interestingly, Gardner at Imperial College now aims to extend his EHS section classification work to stainless steel EHS, which have



also recently become available as structural sections.

Connections always represent a potential problem in tubular construction due to the high flexibility of the hollow section walls, and only recently have there been any studies on welded EHS connections. Bortolotti et al. (2003) and Pietrapertosa and Jaspart (2003) in Liège, Belgium performed the first laboratory tests on trusstype N- and X- connections, with EHS branches welded to the wide side of the EHS chord, followed by numerical modeling of the same connections. Choo et al. (2003) in Singapore extended the finite element modeling of EHS-to-EHS X-connections by studying branches welded to both the wide and narrow sides of the chord, and with the branch also oriented in both orthogonal directions for each chord orientation. They concluded that ... "with appropriate orientations of the elliptical brace and chord sections, axially loaded EHS X-joints can provide higher strength than CHS joints with the same brace and chord sectional areas."

A recent study in Canada on EHS connections consisted of gusset plates and through plates (both longitudinal and transverse) welded to both the wide and narrow sides of an EHS chord (Willibald et al. 2006b). In the analysis of these tests, the notion of using EHS dimensions in established formulae for CHS and RHS connections was attempted, as had also been tried by Bertolotti et al. (2003). The design of CHS and RHS welded connections is now based on over 40 years of international research, so the prospect of repeating this research volume for EHS members is daunting-hence the quest to relate EHS connection design to other established design procedures for hollow steel sections.

Finally, if EHS members are used as diagonal bracings in braced steel frames, or as truss web members connected via gusset plates to the truss chord, a convenient and simple connection method can be achieved by slotting the gusset plate into the EHS member end, or by inserting the EHS into a slotted gusset plate. Both of these connection options have been studied, both experimentally (Willibald et al. 2006a) and numerically (Martinez-Saucedo et al. 2005). Simple design procedures for these connection types, based on the limit state of circumferential fracture of the EHS induced by shear lag, and on the limit state of tear out (block shear) of the EHS, have recently been advocated (Martinez-Saucedo and Packer 2006).

#### References

ASTM. 2001. "Standard specification for hotformed welded and seamless carbon steel structural tubing," ASTM A501-01, ASTM International, West Conshohocken, Pa.,

Bortolotti, E., Jaspart, J.P., Pietrapertosa, C., Nicaud, G., Petitjean, P.D., Grimmault, J.P. and Michard, L. 2003. "Testing and modelling of welded joints between elliptical hollow sections," 10th. International Symposium on Tubular Structures, Madrid, Spain, Proceed-

ngs pp. 259-264.

CEN. 2005. "Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings," EN 1993-1-1:2005(E), European Committee for Standardization, Brussels, Bel-

CEN. 2006a. "Hot finished structural hollow sections of non-alloy and fine grain steels - Part 1: Technical delivery conditions," EN 10210-1:2006(E), European Committee for Standardization, Brussels, Belgium.

CEN 2006b "Hot finished structural hollow sections of non-alloy and fine grain steels - Part 2: Tolerances, dimensions and sectional properties," EN 10210-2:2006(E), European Committee for Standardization, Brussels, Belgium.

Chan, T.M. and Gardner, L. 2006. "Experimental and numerical studies of Elliptical Hollow Sections under axial compression," 11th. International Symposium on Tubular Structures, Québec City, Canada, Proceedings pp. 163-170.

Choo, Y.S., Liang, J.X. and Lim, L.V. 2003. "Static strength of elliptical hollow section X-joint under brace compression," 10th. International Symposium on Tubular Structures, Madrid, Spain, Proceedings pp. 253-258.

CSA. 2004. "General Requirements for rolled or welded structural quality steel/structural quality steel," CAN/CSA-G40.20-04/G40.21-04, Canadian Standards Association, Toronto, Canada.

Gardner, L. and Chan, T.M. 2006. "Cross-section classification of elliptical hollow sections,' 11th. International Symposium on Tubular Structures, Québec City, Canada, Proceedings pp. 171-177.

Gardner, L. and Chan, T.M. 2007. "Cross-section classification of elliptical hollow sections,' Steel & Composite Structures, in press.

Gardner, L. and Ministro, A. 2004. "Testing and numerical modelling of structural steel oval hollow sections," Research Report No. 04-002-ST, Imperial College, London, U.K.

Martinez-Saucedo, G. and Packer, J.A. 2006. "Slotted end connections to hollow sections," CIDECT Report 8G-1%6, University of Toronto, Canada.

Martinez-Saucedo, G., Packer, J.A., Willibald, S. and Zhao, X.L. 2005. "Finite element modelling of gusset plate-to-tube slotted connec-33rd. Annual General Conference of the Canadian Society for Civil Engineering, Toronto, Canada, Proceedings paper GC-115.

Pietrapertosa, C. and Jaspart, J.-P. 2003. "Study of the behaviour of welded joints composed of elliptical hollow sections," 10th. International Symposium on Tubular Structures, Madrid, Spain, Proceedings pp. 601-608.

Willibald, S., Packer, J.A. and Martinez-Saucedo, G. 2006a. "Behaviour of gusset plate connections to ends of round and elliptical hollow structural section members," Canadian Journal of Civil Engineering, Vol. 33, pp. 373-383.

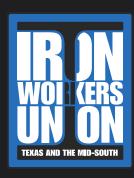
Willibald, S., Packer, J.A., Voth, A.P. and Zhao, X. 2006b. "Through-plate joints to elliptical and circular hollow sections," 11th. International Symposium on Tubular Structures, Québec

City, Canada, Proceedings pp. 221-228. Zhu, Y. and Wilkinson, T. 2006. "Finite element analysis of structural steel elliptical hollow sec-tions in pure compression," 11th. International Symposium on Tubular Structures, Québec City, Canada, Proceedings pp. 179-186.



### ON MISSION CRITICAL JOBS.

The newly merged District Council of Texas and the Mid-South States gives top contractors access to 5,000 of the finest union ironworkers in Texas, Oklahoma, Arkansas, Louisiana, Mississippi, and along the central Gulf Coast. You can rely on this new alliance for top caliber, experienced, certified ironworkers who are drug screened, qualified and ready to tackle the toughest, most exacting jobs with skill. Whatever the challengeunion ironworkers and union contractors have got you covered.



#### **GET MORE. GO UNION. CALL US! 877-493-IRON**

www.IRONWORKERSTEXASMIDSOUTH.com

I.M.P.A.C.T. 800-545-4921

Ironworker Management Progressive **Action Cooperative Trust Ironworkers International Union** 

800-368-0105



# A Complete Fabrication

BY GEOFF WEISENBERGER
PHOTOS JESSICA SLADEK

An AISC Certified steel fabricator gives us an inside look at its processes.

WOLCOTT, IND. IS ABOUT 100 MILES SOUTHEAST OF CHICAGO. It's what you might call an "average" Midwestern small town. It's surrounded by farmland, the people are friendly, and there's a little diner nearby that serves great country-fried steak. (The waitress had no idea what I was talking about when I used the Texan term "chicken-fried steak" to describe what I wanted for lunch, but we eventually worked things out.)

And in a soybean field just east of town, there's also an AISC Certified Cives Steel fabrication plant. Employing approximately 135 people, the plant has been producing construction-ready structural steel now for 11 years. Last summer, Brian Raff, AISC's manager of certification business development, and I took a tour of the facility to see just what happens to a steel member as it makes its way through a fabrication plant.

The short answer is: a lot! Preparing a steel member for erection involves several processes, including cutting, drilling, welding, cleaning, painting, buffing, and waxing (just kidding about the last two). After a steel mill rolls the steel into structural shapes or plates, the fabricator purchases it and performs most or all of the above processes, converting shop drawings into a physical product.

#### Tracking the Beam

If you've never been to a fab shop before, perhaps the best way to illustrate the fabrication process is to follow a beam on its journey through the plant. The process starts in the front office, where the raw materials—structural shapes—are purchased. With an advance bill of materials, or on some projects an exact piece list from detail drawings, Cives' purchasing department considers quantities and lead times to find the most efficient way to buy its material from a mill or service center.

Included in a recent batch direct from the mill is the beam we're tracking: an ASTM A992 W18×35 section. It's organized, along with a plethora materials of all shapes and sizes—wideflanges, angles, HSS, curved members, you name it—in an outdoor materials storage area at the west end of the plant.





There's a lot of steel here. Walking through the area, you'll notice white numbering written with a paint stick on each bundle of steel. This is for tracking purposes. These same numbers also appear on what's called a cutting sheet. Produced from detail drawings, a cutting sheet is a steel member's record of its visit to the fab shop and gives the fabricator essential information about the steel: shape, size, material grade, special testing (like Charpy V-notch), order number, heat number (from the mill), and weighteverything he needs to know to select the appropriate steel from the materials storage area. It also tells him everything that needs to be done to the member: how long it needs to be, where bolt holes need to be placed, etc.

The cutting sheet also serves to control the flow of material in the early stages of fabrication, traveling with a group of beams through each stage in the plant, allowing employees to know where a beam is at all times and which processes have already been performed on it.

#### **Big Tools**

After the material handler locates our W18×35 section in the yard using the cutting sheet, it's transported via a conveyor system into a small building—the saw house—adjacent to the main plant. This is where the beam is cut to the proper length—per the shop drawings entered via computer numerical control (CNC)—with a large band saw using a tungsten carbide blade.

Once our beam is cut to the proper length, it travels along another conveyor to the drill house, where a massive drill—again, using information input via CNC—makes holes for bolted connections. Holes can be drilled in both flanges and the web at the same time.

An impressive aspect of the drilling and sawing operations at the fab shop is the sheer size and power of the machinery. If you've never seen fabrication machinery in person, either in a shop or at NASCC (www.aisc.org/nascc), the machines are like Incredible Hulk versions of the drill and saw in your garage.

At our next stop, our  $W18{\times}35$  is put into a cambering jig, a steel frame with hydraulic rams that bend it to achieve the specified camber. Since every beam is different, the

#### **Quality Procedures in Action**

Cives' bolt storage area provides a good example of quality certification in action. Here, bolts are stored in large sealed kegs to protect the manufacturer's lubrication. The buckets are labeled to show the bolt size, length, grade, and manufacturing lot. Per AISC Certification requirements, three bolts of each length and diameter must be put through a tensile strength test for each lot, performed on a Skidmore Wilhelm tension-testing machine secured to a steel column. The machine measures the tensile force in the bolt and converts this to kips, and a chart on the wall shows the required load for each bolt size.

Cives considers itself to be a "bolting shop," which means that in situations where bolting and welding are both economical options, it chooses to bolt. Where connection geometry permits, Cives opts for tension-control. These bolts must be delivered with the bolt, nut, and washer all in a container together, ensuring that the installed assembly consists of the lots tested by the manufacturer and that the appropriate tension is achieved.

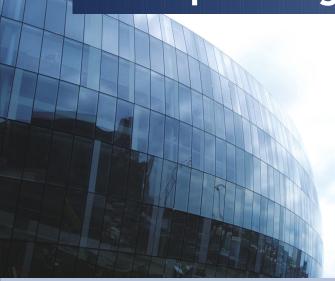
Of course, quality certification goes far beyond bolts, even to areas as simple as tape measures. Over time, the tape measures used to measure the beams become stretched out, so they are calibrated to a "master" tape measure that is usually kept off the shop floor so as not to become damaged.

Another certification procedure involves calibrating the amperage on the welding power supply. This is accomplished with an amp meter, which confirms the amperage in the welding lead near the arc. Amperage (and hence calibration) is an essential variable in a Welding Procedure Specification, because the current affects weld metal tensile properties and toughness.



Visit us at NASCC Booth 1200

## **Uncompromising Service**



Just like the athletes and artists who will perform in the new Sprint Center in Kansas City, LeJeune Bolt demonstrated the ultimate in performance and commitment in the construction of this ambitious project.

Because both the construction schedule and the staging area were tight, LeJeune Bolt pre-assembled the fasteners, then shipped the finished product as needed, and on schedule.

Their large inventory; willingness to preassemble; and experienced precision in sequence packaging and next-day delivery kept the job moving forward, with no downtime.

LeJeune Bolt's unwavering commitment to customer service means that you will get what you need; when you need it; wherever you are; time after time.



TOOLS & EQUIPMENT

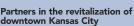
WELDING

ANCHORS/ THREADED ROD

INDUSTRIAL/OEM FASTENERS

STRUCTURAL FASTENERS





Construction Manager: M.A. Mortenson; Minneapolis, MN Architect/Engineer: Downtown Arena Design Team: HOK S+V+E, Ellerbe Becket, 360 Architecture, Rafael Architects; Kansas City, MO

Fabricator: Schuff Steel-Midwest; Ottawa, KS Erector: National Steel Constructors; Plymouth, MI Photo: Hodnett Photographics; Kansas City, KS LeJeune Bolt Company, Burnsville, MN

www.LeJeuneBolt.com • 800.872.2658



UNCOMPROMISING, SINCE 1976

cambering takes a couple of pushes with the rams and is measured by the operator to assure that the camber is correct.

Next, the beam moves into the main fabrication building. The long, open building has an overhead crane runway and flexible workstations with horses for supporting the work pieces, hoists for moving beams and the pieces that assemble to them, and welding equipment. It's currently full of beams in various stages of fabrication. Looking across the large, open space, you'll notice frequent blasts of light: welding arcs and sparks from cutting torches and grinding wheels.

#### **Welding Time**

Speaking of welding arcs, that's where we're headed, as it's time for our beam to be fitted and welded. Fitting involves measuring, layout, and locating welded attachments, such as stiffener plates, to the beam. In contrast to the automated drilling and sawing processes, the welding is performed using a hand-held semi-automatic wire-fed process. Smaller steel pieces such as plates are welded to beams to ready them for connection in the field.

Shielded metal arc welding rods are used for tacking and some smaller welds. These electrodes must be kept in an oven and can't be exposed to the outside atmosphere for more than four hours at a time, or they'll absorb moisture, which can cause hydrogen-induced defects in the welded connection. As such, welders must keep track of how long their electrodes are kept out of the oven.

We watch a welding job in action. The welder attaches a stiffener plate to our beam using the gas-shielded metal arc method of welding. The electrode is stored on a coil that rotates slowly as it's fed to the welding gun. A current from the power supply is used to create an arc that melts the electrode and the base metals, fusing the connected parts.

#### **Learning to Cope**

After the plates are welded to our beam, a fitter/welder copes it by hand with a torch. Coping is where small sections of a beam flange and web are removed to make the beam fit together with supporting members in the field. One of the shop personnel mentions that Cives has purchased a coping machine, which is faster and more accurate than coping by hand. Chuck Hentzell, the human resources manager for Cives Wolcott and one of our tour guides, tells me

that while the fitter will no longer be performing coping duties, he will be trained on other processes within the plant.

#### A Fresh Coat

After our beam has been cut, drilled, welded, etc., it's blasted with fine steel shot, the consistency of sand, to remove mill scale, corrosion, and contaminants if required. In addition to cleaning the steel, shot-blasting also creates an anchor pattern, texturing the metal so that paint can better adhere to it.

Following the shot-blasting, the beam is finally ready to be painted. While our beam requires painting, steel members that will be enclosed in normal ambient conditions—i.e., most of them—typically do not need to be painted.

At the opposite end of the building from where we started is the painting area, in its own separate bay, just beyond the welding operation. Paint is applied via sprayers. Once it is applied, a paint gauge is used to check the thickness of the paint. In addition, shop personnel must check the atmospheric condition of the paint bay before applying it, as temperature and humidity conditions can alter how well the paint will adhere to the metal.



#### Improving performance and independently approved to numerous global standards, Interchar® 212 sets the technology benchmark in providing protection to commercial and industrial steel structures



Interchar 212 is a high performance, zero VOC epoxy intumescent coating with excellent in-place performance, sustainable durability and constructability. Ideally suited for fast track construction, Interchar 212 is designed to be applied in the shop, providing:

- Value added service offer to steel fabrication shops
- · Increased profitability to paint shops
- Favorable strategic positioning with complete bid package

For more information, please contact: International Paint. LLC • 6001 Antoine Drive • Houston TX 77091 • 800.589.1267 www.international-pc.com





🄾 International and all product names mentioned in this publication are registered trademarks. Copyright International Paint LLC, 2008.

# What is Certification?

produces.

Cives' Wolcott facility happens to be an AISC Certified fabricator. But what does this mean?

Certification acts as a statement to owners, engineers, and the construction industry that "Quality is built in." An AISC Certified shop, by implementing a rigid quality management system, can reduce production errors and increase the quality of steel it

To become Certified, a fabricator must undergo an audit of its quality management system—a standardized and documented set of procedures—by Quality Management Company (QMC), an independent, ISO Certified auditing company. There are many facets to the process, including quality verification of a shop's operational procedures, equipment, training, management, and personnel.

Here's how it works. A fabricator looking to become Certified contacts AISC to get the process started. QMC sends the fabricator an application packet, which the fabricator completes and submits (with payment). QMC reviews the package, sometimes requesting additional information from the fabricator, then performs a document audit. After the fabricator responds to any questions regarding the document audit, QMC coordinates with one of its client auditors to schedule an audit of the fab shop.

During the audit, the auditor will notify the client of corrective actions, if any, that need to be taken. This notification is called a corrective action request (CAR). After the audit, which generally takes two days, the QMC auditor writes an audit report, and the fabricator responds to any CARs and has 30 days to provide evidence of CAR resolution. After QMC reviews these responses, certification is printed and mailed. The shop is now an AISC Certified Fabricator!

For more information on QMC and AISC Certification, visit www.qmconline.com.



# Out in the Open Again

Once the paint is dry, the beam is ready to leave the building. Exiting at the opposite end of where it entered, it is placed in another outdoor material storage area, much like the one it resided in when it first arrived. However, it is no longer a raw beam, fresh from the mill—it is now fully fabricated. After a final inspection against the cutting sheet, is ready to be transported to the construction site.

Change orders, of course, are typical in the construction industry, and even after a beam has been fabricated, a design change can effectively "shelve it." If a beam becomes part of a change order, Cives tags it in this storage area to keep it from being shipped to the job site until the proper modifications have been made.

# **Well Prepared**

Hopefully, our tour has given you a better appreciation for and understanding of steel fabrication. Shops like Cives puts a tremendous amount of time and effort into producing quality fabricated products. Speaking of which, I'm not sure where our beam will end up, but I wish it well. No doubt it will do a fine job wherever it goes, considering the preparation it received in Wolcott. And now it's time for that chicken, er, country-fried steak.

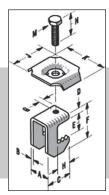
# Bar Grating Attachment MADE EASY



**G-Clips™** attach grating materials to structural members. Installed with simple hand tools, G-Clips are a low cost, fast and dependable way to fasten grating.

- Available in galvanized carbon steel, stainless steel, copper-nickel alloy or aluminum
- No damage to structural members, paint or coating systems
- Resists more vibration than other methods
- Economical, faster and easier installations

Model GG/SSGG: Galvanized carbon steel or stainless steel grating fastener is economical and easy to install. It fastens bar grating to structural members with the structural flange in a horizontal plane.



GFI Grating Fasteners, Inc.

Call Toll-Free: 800-227-9013
P. O. Box 6438, New Orleans, LA 70174

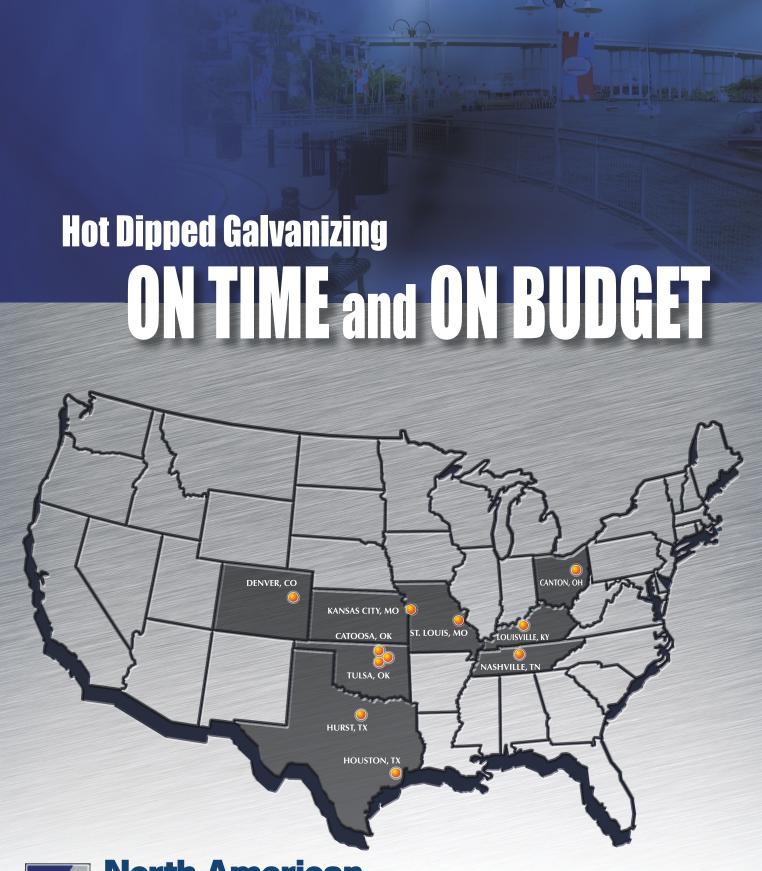
www.gclips.com • Email: sales@gclips.com



# WHY OUR NUTS & BOLTS ARE MORE THAN NUTS & BOLTS.

Even our simplest products are far from basic. Not only do we manufacture a wide range of high-strength construction nuts, bolts, and Tru-Tension™ assemblies, but beyond that we stock a variety of grades, sizes and finishes to meet your not so standard needs. On time. On budget. Plus, our fasteners are made in the U.S.A. and 100% traceable. So no matter where or when a question arises, we'll find the answer. Because the smaller the detail, the harder we work to take care of our customers.

It's Our Nature.®





North American Galvanizing Company

We make steel last longer







www.nagalv.com

(918) 488-9420

# **Empowering Improvement in the Supply Chain**

BY LARRY MARTOF

Defining the parameters of your supply chain and identifying and correcting weak links will help ensure a smooth delivery process and, ultimately, satisfied customers.

ALL BUSINESSES HAVE AT LEAST TWO THINGS IN COM-MON: THEY NEED CUSTOMERS AND THEY NEED SUPPLI-ERS. Simply put, suppliers provide services or commodities, and customers are the recipients of these services and commodities.

Suppliers come in many forms, from retail stores to law firms to steel detailers and mills. Their products and services flow down what is called the supply chain, where each link supplies the next, until the end product is delivered to the final customer.

While the quality of the supply chain of, say, a retail store certainly impacts the customer experience, it is even more crucial in the steel industry. That's because in today's world of high demand for rapid delivery of projects, late receipt or the fabrication or delivery of improper materials can have a tremendous impact on a project and its financials. To better understand this series of interactions, let's reach into our economics toolbox and grab the simple but effective SIPOC tool. SIPOC is a Lean Six Sigma diagram tool that describes the end-to-end delivery of a product as: Supplier-Input-Process-Output-Customer. When we apply this tool to a bridge or building project, we get something like Table 1. In this table the customer of one supplier becomes the supplier to the next. In Table 2, we further expand this scenario and reveal even more supplier-customer relationships.

Table 2 illustrates the supply chain, and any problem in this chain becomes the "weak" link. When the chain becomes stressed it will always break at the weakest link. In this particular chain, we see that the fabricator can influence and control several of these links. The importance of this control is a requirement of the *Steel Building Standard, Simple and Major Bridge* checklists and the *Sophisticated Paint Endorsement Standard*. These requirements are found throughout the documents in the Detailing, Purchasing, Bolting, and Painting sections, among others. We also see supplier requirements in the Purchasing clause of the *International Quality Standard ISO9001* and in the Analysis of Data clause, which is the birthplace of continual improvement within this standard.

To apply the requirements of the above standards, we need to understand two very distinct and separate concepts: qualification (sometimes called "selection") and evaluation.

# **Supplier Qualification**

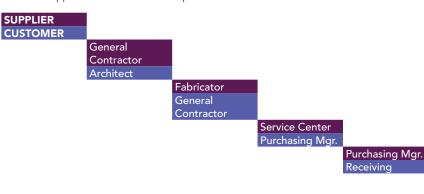
Qualification/selection is basically a one-time process that the fabricator uses to determine whether a potential steel supplier is suitable for further evaluation. The qualification process is typically only repeated when a supplier has undergone a significant change in ownership, location, machinery, or products, or when

Table 1. SIPOC

SUPPLIERS	INPUTS	PROCESS	OUTPUTS	CUSTOMERS
Architect	Design Standard	Approved Drawings	As-Built Drawings	Building Owner
Engineer	Codes & Regs			
Specifier	Design Principles		Product Certs	State DOT
		1		
Steel Mill	Iron Ore	Ť	NDT Reports	Federal Government
Service Center	Steel Stock	Specified Materials		
Bolt Supplier	Rolling Stock	Specified Materials	Material Certs	Occupants
Paint Supplier	Chemicals	1		
		Fabricated Componants	Inspection Reports	Vehicle Owners
Fabricator	Welding	rabricated Componants		
NDT Inspector	Detailing		Completed Assembly	
Calibration	Painting	•		
		Final Assembly	Final Acceptance	
Erector	Welding Assembly	Final Assembly		
Transportation	Blocking	<b>1</b>		

**Quality Corner** is a monthly feature that covers topics ranging from how to specify a certified company to how long it takes to become a certified company. If you are interested in browsing our electronic archive, please visit **www.aisc.org/QualityCorner**.

Table 2. Supplier-customer relationships



Operator Layout Team

Receiving Saw & Drill Operator

> Layout Team Welder

the evaluation process renders a supplier unsuitable, requiring re-qualification. The requirements of the various standards narrow the list of suppliers down to the ones that can directly affect product quality; this in turn narrows the scope of the qualification and evaluation process. Also, the fabricator must look at its business and determine which suppliers influence product quality. This list will include some obvious suppliers like steel mills, steel warehouses/service centers, detailers, and engineering firms, but should

also include bolt and hardware suppliers, welding consumable suppliers, calibration and testing groups, paint providers, painting services, hauling and transportation companies, blast media suppliers, welding gas suppliers, and NDT test providers—and can even include erectors if they are part of the fabrication package.

Saw & Drill

The typical qualification process begins with a survey completed by the supplier. (Refer to the Qualification sidebar for some examples and best practices.) You may decide that an on-site visit



# Qualification

The supplier qualification process fulfills three important needs:

- 1. First, it gathers general information about the supplier: name, address, contact information, references, and product offerings. This information gathering can also include a general survey or assessment of the supplier's quality system, copies of any quality certificates, capacity and capabilities, résumés of key personnel, and even financial information and payment terms.
- 2. Second, it begins the relationship with, and establishes your requirements and expectations of, the supplier and outlines the actions to be taken when performance is unsatisfactory. This includes your supplier rating and evaluation process and your corrective action process as it would apply to the supplier. You should also describe the qualification process in terms of number and frequency of inspections.
- **3.** Finally, the qualification process will establish your evaluation process and ongoing performance monitoring.

# **Evaluation**

The supplier evaluation process begins with a performance-based supplier rating system based on defined criteria. Typical ratings are:

- → PREFERRED These are suppliers who have a consistent history of quality and delivery. They are sometimes called "dock-to-stock" suppliers, whose products require no incoming inspections and only random sampling.
- → QUALIFIED Suppliers who have passed the qualification process and are similar to preferred, but who are not as critical to the operation.
- → EVALUATION A new supplier that has not been fully qualified or a supplier that is rarely used and needs a higher degree of incoming inspection.
- → WATCH Suppliers that have had problems, requiring them to be closely monitored.
- → DISQUALIFIED The "do-not-use" list. Any supplier with this rating would require regualification.

Supplier scoring systems can be another effective tool for monitoring and improving the supply chain. They are typically based on a few key areas such as on-time delivery, quality, service, and order accuracy, and use a grading or scoring model. A numeric scoring system is recommended, as it provides for very easy trending, whereas the other methods ("Poor to Excellent" or lettered scoring) would need to be converted to a numeric equivalent before trending and analysis can be done.

The International Quality Standard ISO 9001 requires that data on suppliers is analyzed to drive improvement opportunities. Some companies will use their supply chain rating and scoring system to award their top suppliers and forge strong relationships with the key ones.

Beam Width

Max

Min

# DAITO IS DIFFERENT!

# The drilling machine of "X-Y positioning 3 drills" method

Three drills (left/right/top) travel 2 dimensionally while the workpiece is firmly held by vises...this original method of Daito enables unrivaled speed and accuracy.

CLEANING BRUSH  TWIN MEASURING DISK  WORK FEED ROLLER (PINCH ROLLER)  VISE  DRILL SPINDLE
2008 NASCC BOOTH #224



CSD II 1050

40

6

1350

51 1/2



DAITO U.S.A., INC.

1470 Elmhurst Road, Elk Grove Village, IL 60007 Tel: 847-437-6788 http://www.daitousa.com

(in)

1570

59

8





is needed, and you may even require your own supplier audit as part of the qualification process. Your qualification process may also include an inspection regimen to ensure the quality and timeliness of initial shipments. The important thing is that the output of the qualification process is documented, because this will become the foundation for the evaluation process.

# **Supplier Evaluation**

Supplier evaluation is the ongoing process of monitoring supplier performance and taking action based on the results. The Building Standard requires a periodic evaluation of suppliers. This can be interpreted as conducting an annual review/evaluation of those suppliers that affect product quality. As with all requirements there is a "high road" and a "low road." Producing and maintaining a list of approved suppliers/vendors—based on their quality and timeliness-that is reviewed by the management review team and approved for use in the coming year meets the minimum or "low road" requirement. This is actually a good method for suppliers that are less critical to the supply chain or that have less of an impact on your product quality. For the more influential or greater impact suppliers, you may want to consider the "high road." (See Evaluation sidebar.) This involves a formal evaluation and rating of "key" suppliers performed on a quarterly or semi-annual basis, and allows for trending of data that can be used to identify a negative trend and take proactive measures to correct it before it impacts delivery or quality. The corrective action system is a great tool for initiating actions to improve a supplier. When it is explained to and understood by the supplier as an opportunity for improvement, it becomes an invaluable tool for forming long-term supply chain partnerships.

# Fixing the Weak Link

By effectively defining and implementing your supplier qualification and evaluation processes, you can identify and react to a potential weak link in the supply chain and prevent it from having a negative impact on your customers.

Larry Martof is president of Process Improvement Solutions and is an ASQ Certified Quality Manager; a RAB/QSA Lead Auditor—ISO9001, TS16949, and AS9100; and a Certified Lean Six Sigma Master Black Belt.

# Voortman Corporation The leading supplier of

high performance fabrication machinery for the structural steel industry.

For the processing of structural steel **beams, flats, angles** and plates, Voortman offers unrivaled solutions.



V600



V630



**VB-range** 



V806M

drilling systems • punching & shearing systems • cambering machines • band saws • beam coping systems • beam welding machines • plate processing machines • shot blasters • stock systems



V550



7505





V250



V2000

Voortman USA Corporation • Unit F 450 South Spruce St. • Manteno IL, 60950 USA T: +1 (0)815 - 935 3010 • F: +1 (0)815 - 935 2201 info@voortmancorp.com





# Tons of Reasons to Plan on Steel.

Make big plans. We've got you covered.

Our network of steel service centers located throughout the country have deep inventories of structural steel readily available. We'll pre-process your order to exact specifications and deliver when you need it to keep your project on track and budget.

Make Metals USA part of the team when planning your next project and guarantee a strong start and a fast finish.

Visit us at Booth #608 at the NASCC 2008 Steel Conference, April 2–4, Nashville, TN



www.metalsusa.com



Ohio Valley Region Jim Wisbon jwisbon@metalsusa.com 800-569-5830

Notheast Region Jim Urban jurban@metalsusa.com 800-523-3340

Western Region Beverlea Bons bbons@metalsusa.com 800-284-7321 Project Supply Jim Collins jcollins@metalsusa.com 800-523-3340

Mid Atlantic Region Gary Mobley gmobley@metalsusa.com 800-334-4511

Southeast Region Mickey Marshall mmarshall@metalsusa.com 800-277-0476

We Sell Service.



# DON'T SEND YOUR TOP TALENT OFF THE TRACKS

BY TIM TOKARCZYK, WILLIE HEPWORTH, AND VANESSA WINZENBURG

# Organizations create the conditions under which careers flourish or fade. Is yours doing all it can to prevent career derailments?

**EMPLOYEE DERAILMENT** occurs in organizations in every industry. Most employees can recall an individual who seemed destined for the highest levels of leadership, yet took a drastic turn and flopped.

Jim is such a leader, one who advanced quickly in his industry, but experienced derailment as he tried to transition into a new position.

Jim is a 15-year construction veteran with a background in finance and a great deal of field experience. Jim experienced many successes throughout his career, and as a result, the executive team considered him to have high potential for leadership success. Two years into his current role, Jim seemed poised to make the next leap in his career. Instead, he hit a wall. His performance began to suffer noticeably, causing Jim to grow more and more frustrated and increasingly alienated from his coworkers. Senior leaders could not explain the change they witnessed in Jim. He was on the fast track to becoming CFO, then inexplicably, his behavior changed. He became rigid and stubborn, and stopped listening to those around him. Senior leaders concluded that their earlier assessment was erroneous, and Jim was not executive leadership material.

# Career Derailment

Unfortunately, stories like Jim's are all too familiar throughout the construction industry. Many employees set at full-steam ahead are coming off the tracks, their careers derailed. According to research conducted by the Center for Creative Leadership, between 30% and 50% of all high-potential employees derail. This trend exacerbates one of the most serious challenges currently facing the construction industry: recruiting and retaining top talent. The construction industry's annual turnover rate recently leapt from 23.2% to 25.4%. And, FMI research supports that the No. 1 industry challenge is a lack of skilled management. Baby boomers are retiring, and there are too few replacements in the pipeline. Firms with significant growth projections face an even greater challenge. With these trends, firms cannot afford to lose even a single high-performing employee, let alone 30% to 50% of its star talent.

In addition to the challenges of finding and keeping star talent, a number of costs are associated with a derailed employee. These costs include the exit and re-hire process, as well as lowered morale and productivity in employees witnessing the derailment. Conservative estimates of the direct costs of employee turnover hover between \$10,000 to \$30,000 per field-level employee, with

much higher costs within the leadership ranks. Indirect costs, such as lowered morale and productivity of remaining staff, can become self-perpetuating, as stress and reduced commitment and energy spread throughout the ranks. Furthermore, it can take an average of \$20,000 in training and 13 months for new employees to operate on the same level of efficiency as more experienced workers. In companies with high levels of employee turnover, these costs can be enormous.

# Why Derailment Occurs

Employee derailment can occur for many reasons. Some employees plateau for personal reasons that are beyond the control of the firm, like a birth in the family or the need to care for a sick parent. The stresses of these life events shift the employee's focus and energy away from their work. Others, however, derail due to factors well within the control of the organizational culture or inadequate leadership development. Derailment is a process. It doesn't happen overnight, and it can be prevented, interrupted, or reversed in many cases. It is helpful to understand the steps in the derailment process:

- **1.** Individual performance levels off or declines, and the organization cannot figure out how to "fix" the individual. This results in a decrease in worker productivity.
- 2. The organization loses patience and tolerance, and the individual becomes frustrated.
- **3.** The individual resigns, is terminated, or is bypassed.

# **Skill-based Causes of Derailment**

Research by the Center for Creative Leadership suggests that most executives who derail were once on the career fast track, running up an early string of successes. However, as leaders advance in the organization, job demands change. With the advent of new responsibilities and measures for success, leaders often struggle to transition from reliance on the skills used to succeed early in their career to the skills necessary to succeed in their new position. The four primary skill-based causes of derailment are:

- ✓ Problems with interpersonal relationships.
- ✓ Failure to meet business objectives.
- ✓ Failure to build or lead a team.
- ✓ Inability to change or adapt.

Often, derailing employees are struggling with more than one of these challenges simultaneously, since the causes for derailment are closely related. Derailed employees often display the following

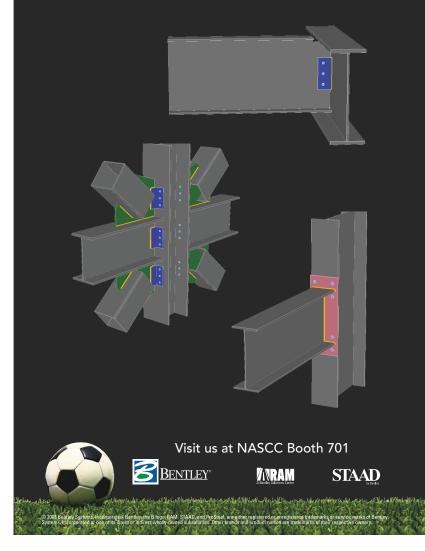
# WWW.BENTLEYSWINNINGTEAM.COM/MSC

# **BENTLEY'S INTEGRATED** CONNECTION DESIGN FOR SHEAR, MOMENT AND **BRACED CONNECTIONS**

YOU CAN MODEL, ANALYZE AND DESIGN YOUR STRUCTURES IN STAAD.PRO, RAM ADVANSE, OR RAM STRUCTURAL SYSTEM - AND **USE RAM CONNECTION FOR SEAMLESSLY INTEGRATED DESIGN OF** SHEAR, MOMENT AND BRACED CONNECTIONS.

And RAM Connection can be used for design of single connections and to create your details for use in your drawings.

To find out more and view videos on this solution visit www.BentleyWinningsTeam.com/MSC or contact us at 1 800 Bentley or structural@bentley.com



behaviors, as opposed to those displayed by actively engaged employees:

# Derailed Employees

Ego-Driven

Reckless

Rigid

Controlling

Mistrustful

Aloof

Seeking Validation

# Engaged Employees

Self-Confident

Purposeful

Open-Minded

Guiding

Trust Guardedly

Involved

Seeking Feedback

The most common challenge faced by leaders who derail is the inability to adapt to new situations and roles. Research shows that two-thirds of derailed American leaders displayed an inability to change. These leaders sometimes display an overt resistance to change, rigidity, or inflexibility. More frequently, leaders derail during times of transition. They have difficulty understanding their new roles and adapting their behaviors appropriately.

# **Organizational Causes of Derailment**

What makes construction a particular minefield for potential derailment? Organizational cultures play a significant part in the derailment process. Many companies in the construction industry deliberately create cultures that foster and reward an achievement-at-all-costs mentality. They select and promote high achievers, let nature take its course, and look the other way as long as the numbers are good. Without the benefit of appropriate leadership development opportunities, high achievers with inadequate or dysfunctional leadership qualities can derail not only themselves, but also may send up-and-coming talent off the tracks or directly to competitors.

Three dysfunctional cultures can result from the impact of leader personality on organizational culture, including suspicious cultures, dramatic cultures, and detached cultures. Suspicious cultures result from suspicious leadership—or mistrust of others—secretiveness, and envy. Suspicious cultures often work to derail individuals,

since the lack of trust and open communication create performance challenges for even the most effective leaders.

Dramatic leadership is characterized by a need to impress and get attention from others. Dramatic leaders create dramatic cultures where risk-taking and thrill-seeking are rewarded, rather than rewarding planned, thoughtful, and perhaps even ethical behavior. This can create a false sense of invincibility, which often precedes a disastrous misstep.

Detached leadership involves a pattern of non-involvement and is characterized by a withdrawn leader. The culture of an organization with detached leadership lacks connection with the leader and his or her vision. In these cultures, employees are unwilling to buy into the leader's vision and remain unmotivated and uninspired. Leaders in this environment are so detached from the rest of their organization that they have little or no influence on results.

# **Preventing Derailment**

Simply because a leader derails in one organization does not mean that his or her career is over. This is where derailment and retention issues are highly related.

Imagine what would happen if you or one of your senior managers derailed. The potential losses in productivity and potential contribution would be great. Moreover, such derailment would have a devastating impact on the organization's culture and the morale of other employees. As a leader, it is critical to examine:

- ✓ What do you see happening in your organization that could contribute to your own or others' derailment?
- ✓ Is there anything you are doing as a leader that could be sending you or other top talent off the tracks?
- ✓ What can you do to prevent the derailment of others?

The good news is that derailment is often preventable and reversible. There are numerous strategies for leaders and organizations to get disengaged employees back on track, prevent future derailments, and shape the type of organizational culture that fosters engagement and commitment. Some strategies to consider include:

**Expand leadership development.** Widen access to leadership development programs to both rejuvenate mid-career managers and refill the leadership pipeline. The first step in this process is to assess the

organization's culture to determine how well employees are trained to lead teams, how much focus is given to a person's interpersonal skill development, how well people are supported in times of change, and how much support is given when a person fails. These are early indicators of how well an organization manages its potential derailment problem.

Focus attention and resources on periods of transition. Organizations can ensure that rising employees make a smooth transition into their new roles through the use of training, mentorship, and orientation for new leadership positions. By focusing more attention during these tumultuous times, organizations can ensure that their newly appointed leaders have all the tools necessary to succeed in their new position.

Find the keepers. Consider the use of performance management systems to identify specific development needs, identify and reward high-performing employees, and target the right career development opportunities to employees at all levels within the organization.

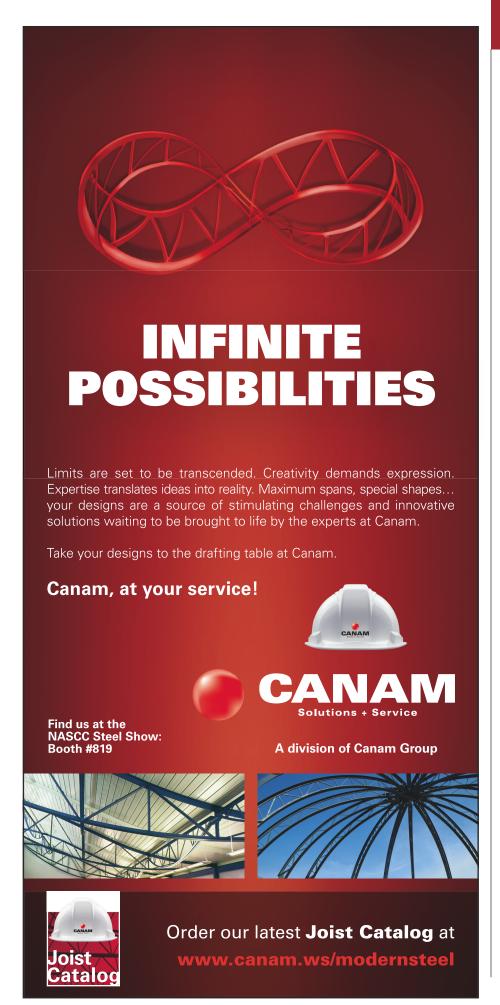
Remove the barriers to occupational mobility. Training today is disproportionately aimed at the young or high-potentials. Many older workers are in real danger of reaching a career plateau. Senior leaders also need continuous learning opportunities and room for development, and can often be overlooked by an organizational focus on training and developing younger employees.

Mentor colleagues. Put experienced employees into mentoring, teaching, and other knowledge-sharing roles. This has the dual benefit of reengaging the midcareer worker and boosting the expertise and organizational knowledge of less experienced employees.

# **Reversing Derailment**

The key to reversing the derailment process is early identification. This means recognizing that a leader is derailing before he or she is ready to leave the organization. Reversing derailment is a collaborative process. The employee and his or her leaders must work together to identify the reasons for the derailment (lack of skills, personal factors, organizational factors) and potential solutions. The employee who is derailing must become aware of his or her failure to meet business objectives and must have





hope that the situation is reversible. Self-awareness is a major step on the road to overturning derailment.

Possible solutions include the use of 360° feedback and personality, cognitive, and natural-ability assessments to enhance self-awareness. Specifically, these assessments can pinpoint ineffective behaviors or personal attributes that may be contributing to the leader's inability to perform in a new role or position. Self-awareness can also help to improve team-building skills and decrease ego problems. In addition, an executive coach can help with selfawareness; executive coaches help leaders develop skills and tactics to improve their leadership as well as strategies for adapting to their new environment. Often, providing additional assistance will revive derailed leaders' passion for their work and provide them with a clear purpose or personal mission, helping them get back on track.

The same senior executives that deemed our construction executive, Jim, unfit to be CFO, later scrutinized why they had such a large retention problem among their high-potential employees. In their analysis, they realized that Jim's career stalled because he lacked interesting and exciting work. Thrown into his current position, Jim felt unprepared and faced daily challenges without the necessary skills to overcome. He focused his energy on task-based, rather than relationship-oriented, leadership. After further consideration by senior management and participation in leadership development opportunities, Jim became procurement director. In this role, his innate skills and enthusiasm as a negotiator, financial analyst, and risktaker paid off. In his first year, he saved the company \$7 million while doing work he loves. While not every derailment story ends on such a positive note, Jim's eventual success serves as a vital reminder that derailed employees can get back on track and add real value to their organizations.

Vanessa Winzenburg is a consultant with FMI Corporation and can be reached at vwinzenburg@fminet.com. Tim Tokarczyk is a consultant with FMI Corporation and can be reached at ttokarczyk@fminet.com. Willie Hepworth is a consultant with FMI's Leadership and Organizational Practice group and can be reached at whepworth@fminet.com.



# **Structural Bolts**

Major distributor of a full line of Heavy Hex Structural Bolts ASTM A325-1, A325-3 and ASTM A490-1, A490-3. Major distributor of a full line of Tension Control Bolts ASTM A325/F1825 and ASTM A490/F2280. All available in domestic with full Mill Certifications and in-house Rotational Capacity Testing available upon request.

# Fabricated Steel Anchors & Rods

Haydon Bolts, Inc. has been serving structural and miscellaneous steel fabricators for over 143 years, manufacturing anchor bolts



and tie rods up to four (4) inches in diameter and using materials such as ASTM F1554 grades 55 and 105, A588, A325, A449, A490, A354 and A193. All made of domestic steel with full Material Certifications available.



# Wrenches

Standard TC & TC Indexable Wrenches and Torqon Adjustable Control Wrenches for hexagon head structural bolts available from stock. Replacement parts and repair service available.



# HAYDON BOLTS, INC.

1181 Unity Street
Philadelphia, PA 19124
215.537.8700 / Fax 215.537.5569
www.haydonbolts.com



# 1/2 the price! 1/2 the floor space! 2x the versatility!

CNC layout and drilling of

- ✓ beams and channels
- ✓ flat bars and base plates
- ✓ square and rectangular tubes
- ✓ round tubes and pipes
- ✓ tapered and pre-cambered beams
- ✓ stair stringers and welded connections

Drills 1/4" to 2" diameters
Drills steel up to 10" thick
Easy import of CAD detailed
drawings
Built by Peddinghaus



# AVERGER CNC BEAM DRILL LINE



Visit us at NASCC Booth 119

# Call for a FREE Video & Brochure

Tel 800.286.3624 • 954.956.3131 • Fax 954.956.3199 • www.oceanAVENGER.com • www.oceanmachinery.com 6720 NW 15th Way • Fort Lauderdale, FL 33309, USA

# SPECIAL TREATMENT

When it comes to fabrication, design, and welding of steel shapes, working with HSS is a whole other ball of wax.

BY THOMAS J. SCHLAFLY

**AS HOLLOW STRUCTURAL SHAPES** (HSS) are inherently different than more common W-shapes, it's no surprise that their design and fabrication are different as well. And because HSS are closed sections and cannot be reinforced or even accessed on the back side, they are also subject to unique welding requirements.

The differences between HSS and other shapes are significant enough that AISC at one time published a separate HSS manual. However, AISC moved the specification provisions for HSS connection design into Chapter K of the 2005 AISC specification to ensure that they were readily available to engineers.

The American Welding Society (AWS) also originally dedicated a chapter of AWS D1.1, *Structural Welding Code—Steel* specifically to HSS provisions, but following a reorganization in 1996, distributed those provisions to the various chapters of the code (these provisions include design, fabrication, and qualification requirements for welders and welding procedures). But besides these written provisions, there are also real-life lessons to be learned about welding HSS connections.

# **Overlapping Connections**

Many HSS connections come in the form of overlapped K connections, where one branch overlaps the other (see Figure 1). This creates an area where two pieces of HSS meet, one that cannot be seen after fabrication. This is known as a "hidden joint," and this situation raises a question: Does a symbol showing a weld on the *visible* branch-

to-chord joint indicate a weld on the *bidden* branch-to-chord-joint? A welder with little experience with tubular joints would think it unreasonable to *not* weld the hidden joint. But welders that routinely work with HSS are aware that the overlapping diagonals frequently do not have clearance for fit-up after the overlapped branches have been welded. This is particularly true for round HSS. If there is a sequence that works, it may demand repeated repositioning of a truss to do it.

While positioning a beam takes a lot of time, positioning a truss takes even more time. So the welding of the hidden joint can get pretty expensive, much more so than simply adding arc time for the additional inches of welding. As such, there are "rules" as to when the hidden joint needs to be welded—and quite often it does not (see p. 378 of the 2005 AISC specification Commentary K2). Therefore, it is reasonable to interpret a symbol indicating a weld only on the visible joint to mean that no weld is necessary on the hidden joint. Bottom line, welding symbols indicating a weld in a hidden joint must be clear and specific.

# **Gapped Connections**

Of course, another way to eliminate issues with the hidden weld in an overlapped connection is to use a gapped connection instead (see Figure 2). While it is true that this may cause an eccentricity on the chord, and may also cause increased deformation of the connecting chord face, the research on gapped connections is thorough and the design methods are clear in Chapter K of the AISC specifica-

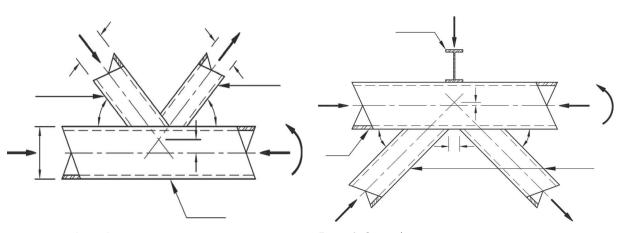
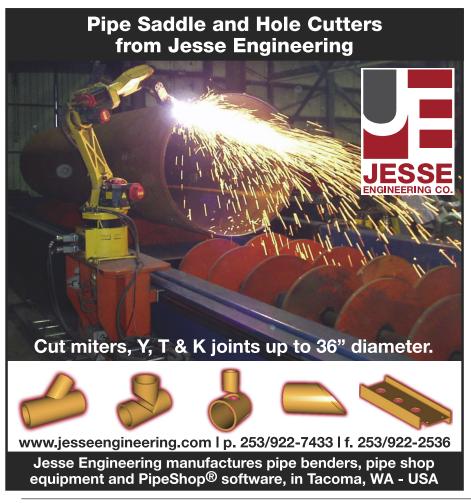


Figure 1. Overlapped connection.

Figure 2. Gapped connection.





tion. With gapped connections, the chord and weld sizes often do not have to be increased from those used with overlapped connections, and the cutting, fitting, and welding are significantly simplified.

# **Gusset Plates**

Another way to reduce problems with HSS truss-type connections is to use gusset plates. They can be cut and finished to suit architectural requirements, and used to eliminate the unusual geometry in cutting, tolerance issues with fitting, and one-sided welding associated with direct-welded truss connections. And on the design side, they can eliminate problems with punching shear and ovalization.

# **PJPs and Fillets**

Partial joint penetration (PJP) welds or fillets make the cutting and qualification easier, and on round HSS can often be designed to develop the strength of the branch or the capacity of the connection. Fillets work particularly well in "stepped" square/rectangular HSS connections where the branch members are about 80% of the width of the chord. That width ratio gives the welder a place to put the fillet, and the designer still obtains a high connection capacity, unlike with smaller branch members. When PJP welds and fillets are used, the designer must be wary of uneven loading (hot spots) along the weld. (Provisions for this are included in AISC and AWS design specifications.) The designer also must check side wall crippling and face plastification, which occur differently than with open-section connections.

Where the HSS members to be connected are rectangular and have the same width, the corner radius of the chord member leaves a gap between the chord and the branch that must be filled. There are a number of conventional ways to deal with that gap, but they all involve expenses that are avoided if stepped connections are used.

# **Lessons Learned**

There are many lessons to be learned in the design and construction of HSS truss-type connections. But the lesson that encompasses them all is this: Connection and welding issues play an even larger role when choosing HSS member sizes than when choosing open-section member sizes.

Tom Schlafly is AISC's director of research.

# XTREME PRODUCTIVITY





The Single Robotic Plasma Structural Fabrication System That Does The Work Of Seven Machines -

Cut Bolt Holes
Cut to Length
Cut Slots
Notch
Cope
Bevel
Miter Cut
Scribe/Mark



BURLINGTON AUTOMATION www.pythonx.com
for a free DVD call 905-681-9622



# When Precision Matters

Architects, manufacturers, and designers depend on the experts at Max Weiss Company to roll and form structural steel to precise specifications. Tight radii, ellipses, bends with tangents--no matter what unique bending needs your project requires, we can custom roll, hot-form, and fabricate parts that fit perfectly. Our customers have relied on us to bend carbon steel, stainless, aluminum, copper, and brass in all shapes and sizes for over sixty years. We also provide value added services including welding, threading, cutting, and drilling. Let our experience save you time, money, and frustration!

If you can imagine it, we can bend it. Call today for a quote.

8625 W. Bradley Road, Milwaukee, WI, 53224

Phone: 414.355.8220 • FAX: 414.355.4698 • Email: SALES@MAXWEISS.COM

W W W . M A X W E I S S . C O M

AS/NZS ISO 9001: 2000 Certified AISC Associate Member



# THE PROGRESSION OF THE STRUCTURAL ENGINEER

What is truth? An experienced structural engineer found that when it comes to design, truth changes over time.

BY ERIK NELSON, P.E., S.E.

**THERE SEEMS TO BE A PROGRESSION** of understanding throughout the life of a structural engineer. In my case, as a college student I think I was drawn to engineering because it seemed to be an entirely rational field of actual correct answers to problems. It gave me well-defined analytical techniques to arrive at a certain beam or column size.

But this idea of "truth" and "correct" answers proved naïve. Structural design is not as clean as I had thought. The problems I solved in homework assignments were not similar to the problems encountered in practice. Today, I can look back at my design career and see a certain progression of understanding, an improvement in design skills resulting from a raised consciousness. As an engineer's career progresses, he realizes that the problems he encounters are not simple, but complex and nuanced, and require

experience to better sift through their multiple solutions; there is never just one!

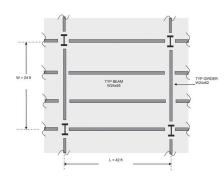
I think this idea of progression is similar to the one that the philosopher Friedrich Nietzsche wrote about in *Twilight of the Idols*. While Nietzsche was generally referring to raising the human spirit to a higher level, this is similar to my experience as a structural engineer over the past decade.

To better understand this progression, let's use the example of designing a steel floor system. We'll solve for various designs using the same assumptions: 24-ft by 42-ft interior bay with a 3¼-in. lightweight concrete plus 3-in. metal deck supporting a 50-psf live load and a 20-psf superimposed dead load. In this scenario, the structural designer's progression of understanding—from engineering student to principal—may go something like this...

# Structural design to an engineering student:

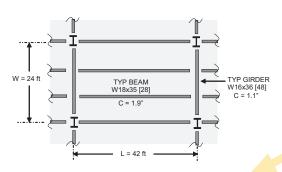
Structural design is nice and exact. That is, given the length, loading, and other assumptions of a particular beam, I can design it and actually have a correct answer. Structural design is wonderful and objective, not so touchy-feely like the arts. W24×55 is the answer, period.

"The truth of structural design—Attainable for the sage, the pious, the virtuous man."



# The "Pious" Design

The design neglects use of composite action, which was not included in the student's steel or concrete class. The student did check deflection however, and found the beam to be controlled by it. Overall, the design is too heavy and costly.



# The "Virtuous" Design

The engineering graduate uses composite action and pushes the limit of precomposite dead load deflection. The exactness of the beam camber is academic and too exact. The deep beam framing into a shallow girder is, in a word, ugly. This design shows signs that it came from computer output that was not reviewed. The shallow girder may lead to future vibration problems. Overall, the design is not practical.

# Structural design to an engineering graduate:

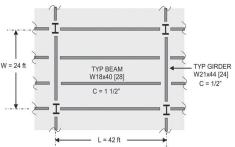
Structural design is harder than I thought. I have to understand unbraced lengths, deflection limitations, vibration, and modeling assumptions. I also need to study up on steel connections, coped flange shear capacity reductions, composite beam design, camber, stud capacity and count, lower bound moment of inertia for deflection, etc. I'd better hit the books!

"The truth of structural design—Unattainable for now, but promised for the sage, the pious, the virtuous man."

# Structural design to an engineer-in-training:

Structural design isn't as exact as I thought. This floor system doesn't seem to make sense when only optimizing for strength. The best design in terms of steel tonnage could be a deep beam that frames into a shallow girder, but that doesn't "feel" right. Maybe I should also think about repetitive use of beams, or maybe I should think about piece count (crane time). I might not have the exact answer, but I'd better get close!

"The truth of structural design—Unattainable, indemonstrable; but the very thought of it, a consolation, an obligation, an imperative."



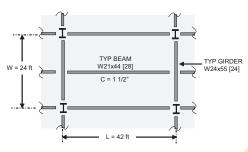
# The "Unattainable" Design

The beam camber is more reasonable and the girder now has only one stud per foot. Although this engineer decided that "truth" is unattainable, he or she got pretty close. The floor frequency is better and there is less likelihood of having problems with over- or under-camber in the field, although some engineers feel that beams should not be cambered if they are less than 30 ft long. Overall, the design is okay.

# Structural design to a senior engineer:

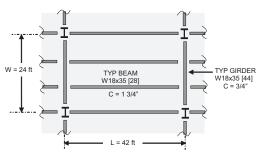
The criteria for structural design are becoming too subjective, not like the good old days. Should the beam be cambered at 30 ft long? What percent composite shall I assume? Maybe I should try to stretch my composite slab to 12 ft instead of the standard 10 ft. Should I use live load reduction for beams, or just for columns? You do it your way and I will do it mine.

"The truth of structural design—An idea that is no longer good for anything, not even obligating, an idea that has become useless and superfluous—consequently, a refuted idea. Let us abolish it!"



# The "Not-So-Apparent" Design

The girder was upgraded to a W24x55 so as not to require camber and to reduce risk of excessive deflection and vibration. This is an increase of 0.3 psf in the steel tonnage from the system in stage 5, but the payoff is well worth it. It also anticipates possible 12-in.-deep web penetrations. This appears to be the best design of the six and is economical (a full 1 psf lighter than the system in stage 4). Overall, the design is good.



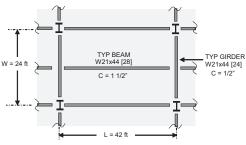
# The "Obligated" Design

Camber is in increments of  $\frac{1}{2}$  in. for now, but may become excessive and lead to problems with floor leveling and over-camber. This designer values repetitive use of beams (or perhaps values double copes). The girder has more studs than one per decking rib, which requires a stud reduction factor  $R_g = 0.85$ . Also, the floor may lead to undue vibrations. Overall, the design is risky.

# Structural design to an engineer:

Can I design a steel floor system using certain optimization criteria (tonnage, piece count, repetitive sizes, etc.) and get close to a "correct" answer? I can create a matrix and weigh tonnage, piece count, and repetitive use of similar beams. But which to give the most weight? Maybe the best design has to do with how I weigh each criterion. Is that it? Who knows?

"The truth of structural design—Unattainable? At any rate, unattained. And being unattained, also unknown. Consequently, not consoling, redeeming, or obligating. How could something unknown obligate us?"



# The "Abolished" Design

The slab span changed from 8 ft to 12 ft, pushing the limit of the 6¼-in. slab for the unshored condition. This results in a lower piece count and less tonnage. Some designers may feel uncomfortable with a 12-ft slab span, but the design appears economical. The girder stud count is high. The floor system frequency is a bit low at 4.1 Hz, but is okay. Overall, the design is pretty good.

# Structural design to a principal (the final progression):

Structural design is tricky and requires a lot of experience to get right. One particular framing system is chosen not because it is the truth, but because it is "practically the truth." And "practically the truth" is enough to discover that one system is better than another. You see, structural design is really not objective. There really isn't one answer; there never has been. The problem is that design is perceived that way and has an objective truth assigned to it. Once you abolish this misconception, the creative possibilities are once again limitless.

"The truth of structural design—We have abolished. What world has remained? The apparent one, perhaps? But no! With the true world we have also abolished the apparent one."

# Six Degrees of Floor Design

All six of the framing schemes work and all six have the same bay size and loading assumptions. Thus, it is apparent in this progression the great extent to which the individual engineer can influence the design. I have found that the design of structures is less dispassionate and logical than I used to think earlier in my career. Subjective terms in structural engineering (good, ugly) can and should be used alongside objective ones (0.3-in. deflection, 5 psf), because many of the problems we face become subjective—and that is a good thing. I think this arises from the fact that there are no clear-cut answers to the complex and diverse problems we face. This is not to diminish the role of analytical tools to assimilate knowledge of phenomenon (or of steel), it is just these tools are simply not enough.

All quotes are from Twilight of the Idols by Friedrich Nietzsche, translated by Walter Kaufmann and R.J. Hollingdale, substituting "the truth" with "the truth of structural design."



Erik Nelson is a structural engineer with Odeh Engineers in North Providence, R.I. and an adjunct professor at Rhode Island School of Design.

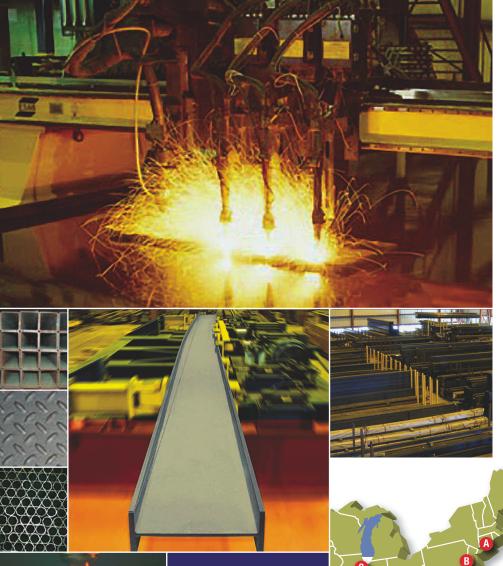
Here, he and son Kinan illustrate the progression of man—from thumbs to coffee.

For comments related to this article, he can be reached at ean@eandesign.com.

Do you have comments on this article? Visit www.modernsteel.com and click on "Reader Feedback" to tell us what you think.







# Our first-stage processing is really a two-step process: Eliminate bottlenecks. Improve cash flow.

The best service available starts with our comprehensive structural steel inventory of more than 250,000 tons, and provides low-cost Just-In-Time delivery through our six Stocking/Processing service centers strategically located for your convenience.

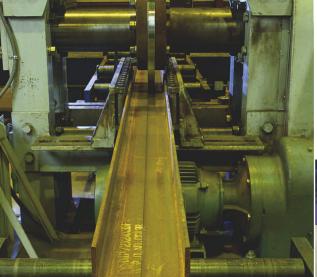
We perform a variety of first-stage processing services using CNC machines for saw, flame, and plasma cutting, Wide-Flange-beam cambering, and rotary-shear splitting for cleaner, straighter Tees. And we support those services with in-house trucks making timely deliveries of pre-processed and stock sections.

For OEMs, fabricators, and local distributors, our services provide greater efficiency in reducing bottlenecks at your shop and in maximizing cash flow by making sure you don't store or finance your material any longer than necessary.

Whether you're looking to avoid a production bottleneck or a cash flow pinch, contact your local Infra-Metals office today or visit *www.infra-metals.com* for a quote on your exact needs.



As an active participant in the AISC, Infra-Metals knows the materials needs and challenges you face.



A. Wallingford, CT 800-243-4410
B. Langhorne, PA 800-899-3432
C. Baltimore, MD 800-235-3979
D. Petersburg, VA 800-435-0850
E. Tampa, FL 800-693-1361
F. Hallandale, FL 800-432-1146
G. Marseilles, IL 800-987-5283





# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

**AAA Galvanizing** 

Booth 1103 Joliet, IL

**Ph:** 815.723.5000 Fax: 815.723.5008 www.aaagalv.com

AAA Galvanizing is a full-service hot-dip galvanizer. We service steel fabrication markets throughout the Midwest with hot-dip galvanizing. AAA Galvanizing has seven strategic locations in Illinois, Indiana, Oklahoma, and Minnesota. AAA can protect virtually all types of steel products through our galvanizing procedure. From a single multi-ton item to thousands of small parts of any shape or size, we have the capabilities to fulfill your hot-dip galvanizing specifications.

# AceCad Software, Inc.

Booth 901

Exton, PA **Ph:** 610.280.9840

Fax: 610.280.9841 www.strucad.com

Established in 1986, AceCad Software is a leading developer of software solutions for the international structural steel industry. AceCad's products include StruCad, the World's leading 3D steel detailing system; and StruM.I.S, the ultimate management information system for steelwork fabricators. Adoption of these products results in significantly increased productivity and generates competitive advantages for users. Together with a range of services including training, technical support, drawing/design offices, and a dedicated hardware business. AceCad offers the broadest integrated portfolio of solutions to the industry.

# **AISC Certification** Booth 739

Chicago, IL **Ph:** 312.670.7520 Fax: 312.896.9202

www.aisc.org/certification

The AISC Certification process involves an assessment to evaluate a fabricator or

erector's quality management system rather than their specific end product. This evaluation looks at processes and procedures, since it's easier to build quality into a project and impossible to inspect for it after the fact. AISC Certified companies have the knowledge, training, experience, capability, personnel, equipment, organization, and commitment to provide a level of quality that you have come to expect and deserve.

# Albina Pipe Bending Company, Inc. Booth 935

Tualatin, OR **Ph:** 503.692.6010 Toll Free: 866.252.4628 **Fax:** 503.692.6020

# www.albinapipebending.com

Specializing in pipe, square, and rectangular tube; structural steel; and spiral bending, forming, and fabrication since 1939. Ability to bend architecturally exposed material ranging from 1/8 in. to 26 in. OD. ½ in. up to 20 in. tubing (easy-way, hard-way, compound, or off-axis). Angle, flat bar, square bar, wide-lange (I-Beam), channel, plate, split tee, etc. (easy-way, hard -way, or off-axis). Architectural exposure-quality spiraling of tube steel, channel, plate, and pipe to amazingly tight radii and steep pitches.

# Algoma Steel, Inc. - Welded Shapes Division Booth 527

Sault Ste. Marie, ON Canada

Ph: 877.855.5595 Fax: 705.945.4316 www.algoma.com

A mainstay of the North American steel industry for over 100 years. Algoma Steel is a fully integrated steel mill, with annual production of more than 2.2 million tons of value-added hot-rolled sheet, cold-rolled sheet, as-rolled plate, and heat-treated plate. With clean steel from integrated steelmaking, Algoma's Welded Beam Division produces highquality welded wide-flange (WWF) beams and welded shapes (WSS).

# Allied Machine & Engineering Corporation

Booth 405 Dover, OH **Ph:** 330.343.4283 Toll Free: 800.321.5537 Fax: 330 602.3400

Toll Free Fax: 800.223.5140 www.alliedmachine.com

AMEC's Exclusive Structural Steel Drilling System provides drill-

ing solutions for the structural steel industry. AMEC is pleased to announce the release of the latest edition of the Exclusive Structural Steel T-A Drilling System Catalog. The newly expanded product offering includes the addition of the Extended Length Structural Steel Holders with #3 Morse Taper Shanks.

# **Allied Tube** Booth 1039

Harvey, IL

**Ph:** 708.339.1610 Toll Free: 800.882.5543 Fax: 708.339.2399 www.alliedflo-form.com

Allied Tube proudly manufactures in-line galvanized tubing and structural angles (Flo-Form) for the construction and OEM marketplaces. Allied's tubing and angles feature a unique method of galvanizing during the production process to produce a zinc-coated steel shape. A broad range of sizes, shapes, and lengths are produced to meet custom manufacturing and fabricating requirements. Allied Tube is a Tyco International company.

# **American Galvanizers Association**

**Booth 1414** 

Centennial, CO Ph: 720.554.0900 Fax: 720.554.0909 www.galvanizeit.org

The American Galvanizers Association (AGA) is a non-profit trade association dedicated to serving the needs of after-fabrication galvanizers, fabricators, architects, specifiers, and engineers, providing technical support on today's innovative applications and state-of-the-art technological developments in hot-dip galvanizing for corrosion control.

# American Institute of Steel Construction (AISC) Booth 739

Chicago, IL **Ph:** 312.670.2400 Fax: 312.896.9022

www.aisc.org

Learn about AISC's products and solutions, including information about our ePubs program. Chat with AISC staff and meet AISC's



# **American Punch Company** Booth 407

Euclid, OH

**Toll Free:** 800.243.1492 Toll Free Fax: 800.261.6270 www.americanpunchco.com

American Punch has been supplying AISC members with the best punches, dies, and shear blades available. We now offer our brand of CobraCut annular cutters, as well as magnetic drills and portable punch units. All CobraCut cutters are made from a special blend of high-speed steel and cobalt. This special blend of material, along with the high-performance cutting tooth geometry, improves cutting ease and tool life-a distinct advantage over all the others.

# American Subcontractors Association, Inc.

Booth 1327

Alexandria, VA Ph: 703.684.3450 Fax: 703.836.3482 www.asaonline.com

Founded in 1966, ASA amplifies the voice of, and leads, trade contractors to improve the business environment for the construction industry. and to serve as a steward for the community. ASA's vision is to be the  $\,$ united voice dedicated to improving the business environment in the construction industry. The ideals and beliefs of ASA are: ethical and equitable business practices, quality construction, a safe and healthy work environment, and integrity and membership diversity.

# **American Welding Society**

Booth 1420 Miami, FL

**Ph:** 305.443.9353 Toll Free: 800.433.9353 Fax: 305.442.7451

www.aws.org The American Welding Society (AWS) was founded in 1919 as a multi-faceted, non-profit organization with a goal to advance the

science, technology, and application of welding and related joining disciplines. From factory floor to high-rise construction, from military weaponry to home products, AWS continues to lead the way in supporting welding education and technology development. Among the American Welding Society's activities are standard development, personal certification, trade show management, magazines, and much more.

# Applied Bolting Technology, Inc.

Booth 1015

Bellows Falls, VT Ph: 802.460.3100 Toll Free: 800.552.1999 Fax: 802.460.3104

www.appliedbolting.com Applied Bolting makes direct tension indicators (DTIs) user friendly. With the introduction of Squirter DTIs, made in accordance with

ASTM F959, we have all but eliminated the need for feeler gages. By eye, one can tell when the bolts are tight. Erectors ask for them by name. Millions of Squirters have been specified and installed on power plants, HRSGs, SCs, LNG facilities, DOT bridges, commercial buildings, and stadiums.



# **ArcelorMittal International**

Booth 718 Chicago, IL

Ph: 312.899.3500 Fax: 312 899 3765

www.arcelormittal.com

ArcelorMittal is the world's largest producer of structural shapes, having served the U.S. market for more than 75 years. Our ASTM A913 Grade 50 and Grade 65 steel offers superior beam characteristics, including higher yield strength, excellent toughness, and outstanding weldability-in most cases, without preheating. We also produce wide-flange beam sizes W14×426 through W14×730 (Jumbos) and numerous deep W36, W40, and W44 beams that are unavailable domestically.

# **Association for Iron & Steel Technology** Booth 1409

Warrendale, PA Ph: 724.776.6040 Fax: 724.776.1880

www.aist.org

The Association for Iron & Steel Technology (AIST) is an international technical association with more than 14,000 members representing iron and steel producers, their allied suppliers, and related academia. The association is dedicated to advancing the technical development, production, processing, and application of iron and steel through a variety of educational and networking programs.

# **Atema** Booth 1224

Chicago, IL

**Ph:** 312.861.3000 Fax: 216.373.7297 www.atema.com

Atema is the only company dedicated to providing quality-related training and assistance for the structural steel industry. Atema specializes in certification/registration for AISC, AWS, and ISO programs by providing pre-assessments, on-call assistance, and on-site customized training programs, and assisting executive managers in targeting quality objectives. Atema also creates specialized private supplier assessment certification and evaluation programs for engineering firms, general contractors, building officials, and DOT Engineers. While at NASCC, investigate one of Atema's unique courses for weld inspectors and CWIs, which combines weld knowledge with improvement quality tools. Discover what Atema is known for: making training fun. And be sure to "Catch your M&Ms!"

# exhibitors

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

Atlas Tube, Inc. Booth 627

Harrow, ON Canada

**Ph:** 519.738.5000 Toll Free: 800.265.6912 Fax: 519.738.3537 www.atlastube.com

With the largest size range and the shortest cycle times in the industry, Atlas Tube has four manufacturing plants strategically located in the U.S. and Canada, and can supply all of your HSS tubing requirements on time, when you want it. 33 different round sizes, 21 squares, and 56 rectangles are available in a variety of gauges and lengths. Atlas Tube is ISO 9001-2000 certified, manufacturing to North American specifications A500, A252, A847, and CSA G40 21

# Aztec Galvanizing Services Booth 939

Fort Worth, TX Ph: 817.810.0095 Fax: 817 336.5354

www.aztecgalvanizing.com

Aztec Galvanizing Services, a division of AZZ, Inc., headquartered in Fort Worth, Texas, owns and operates 14 hot-dip galvanizing plants located in the South and Southwest, along with our newest plants in Indiana and Ohio. Aztec operates kettles ranging from 25 ft to 58 ft in length. With Aztec's network of plants, they are able to accommodate the largest projects with customized turnaround time at a competitive price. Aztec has implemented Galvxtra, their Nickel-Zinc alloy process that provides the ability to meet the highest quality standards necessary in the highly competitive after-abrication steel market.

# **BD Structural Design**

Booth 815 Boucherville, QC Canada

Ph: 450.641.1434 Fax: 450.449.1772 www.bdsd.com

BD Structural Design is a leading structural steel detailing company founded in 1975. Our services cover the production of shop drawing, erection diagram, anchor bolt layout, reports, ABM, connection design cals, and sketches linked with our automatic parametric transfer into the 3D model. The 3D model reflects the design exactly with no possibility of error. We concentrate on heavy industrial building, stadiums, complex architectural building, power plants, towers, and skyscrapers. No limit on size

# BDS Steel Detailers (USA), Inc.

Booth 828 Tempe, AZ

**Ph:** 480.615.1700 Fax: 480.615.1717 www.bdsglobal.com

BDS operates detailing offices in seven countries and it is considered to be one of the largest detailing companies in the world, with over 150 detailers. Offices are located in Brisbane (Australia), Auckland (New Zealand), Oxford (UK), Nottingham (UK), Bangkok (Thailand), Chennai (India), Phoenix (U.S.), and Vancouver (Canada). BDS' reputation for quality and professional service in the steel fabrication industry is unsurpassed and continues to grow as we increasingly provide services to local and international clients. As a leader for the industry, we utilize Tekla Structures as the most advanced software to produce shop drawings for our clients.

# Behringer Saws, Inc.

Booth 433 Morgantown, PA Ph: 610.286.9777

Toll Free: 888.BEHRINGER

# Fax: 610.286.9699 www.behringersaws.com

Behringer Saws is a manufacturer of high-quality vertical and horizontal band saws, circular cold saws, and steel fabricating equipment. Behringer saws are available in automatic and semiautomatic versions, for both straight and miter cutting applications. In addition, Behringer supplies a full array of material-handling equipment to help make your sawing operations highly efficient. Behringer, located in Morgantown, Pa., maintains a large inventory of machines and parts, and houses the industry's most modern sawing showroom

#### Bentley Systems, Inc. - RAM/STAAD Solution Center

Booth 701 Exton, PA

**Ph:** 610.458.5000

Toll Free: 800.BENTLEY

Now with RAM, STAAD, and ProSteel on the Bentley team, we offer the most comprehensive structural solutions in the industry. Bentley's flexible and scalable products allow seamless workflow of analysis, design, detailing, documentation, and BIM for building, plant, and civil applications. Completely integrated solutions are available for various structural materials, including steel.

# **Birmingham Fastener, Inc. Booth 505**

Birmingham, AL Ph: 205.595.3511 Toll Free: 800.695.3511 Fax: 205.591.7107

www.bhamfast.com Birmingham Fastener is a full-line distributor of structural fasteners for both the domestic and international markets. We have a manufacturing facility that enables us to provide you with non-standard structural bolts as well as any type of welded assembly, threaded rod, or bent anchor bolt you may need.

# **Brown Consulting Services Ltd.**

Booth 1029

Houston, TX **Ph:** 281.260.9749 **Toll Free:** 888.728.2272 **Fax:** 281.260.9771

# www.steelconnectiondesign.com

A professional engineering firm located in Houston specializing in structural steel connection design and stair and miscellaneous steel design. Licensed in 46 states and the U.S. Virgin Islands, Brown also offers structural design services, engineering supervision of shop drawings, forensic engineering, expert witness testimony, lump-sum project pricing, professional liability insurance (\$2 million), and quick turnaround. Contact: al@steelconnectiondesign. com for a quote on your next project. Brown is Your Engineering

# **Buckner Companies**

Booth 1229

Graham, NC Ph: 336.376.8888 Fax: 336.376.8855

# www.bucknercompanies.com

Since 1947, Buckner Companies have provided workmanship, met demanding schedules, and completed complex projects. We are ranked number five in ENR's list of Top Steel Erectors. Buckner Steel Erection is an AISC and PCI Certified Erector. Over 600 years of experience is encompassed in Buckner's management and administrative team. Buckner Heavy Lift Cranes has one of the largest and most versatile equipment fleets in the nation and is ranked by International Cranes as one of the top crane companies in the world.

# **Bug-O Systems/Cypress Welding Equipment** Booth 925

Pittsburgh, PA **Toll Free:** 800.245.3186 Fax: 412.331.0383

www.bugo.com

Bug-O Systems/Cypress Welding Equipment, a manufacturer of welding and cutting automation equipment, will display its newest innovations for increasing productivity. The Bug-O Gantry and Side Beam Units are custom-designed assemblies that are used in a variety of applications such as beam and stiffener fabrication. The Mini-Vert is a trackless battery powered fillet welder. The Uni-Bug III can produce stitch or continuous welds and will run on a variety of structural steel profiles.

# **Burlington Automation**

Booth 441 Burlington, ON

Ph: 905.681.9622 Fax: 905.333.1477 www.pythonx.com

Burlington Automation manufactures the PythonX Beam Line, which was designed to replace old-fashioned beam drill lines and band saws for fabrication of structural steel. The PythyonX uses the latest in robotics and plasma technology to fabricate beams, channels, HSS, angle, and strip plate all on one machine. The PythonX can produce AISC-approved bolt holes, copes, slots, cutouts, and cut-to-length; Miter-cut; produce T-Beams; and scribe part/layout marks all in one place, eliminating countless hours of material handling in between operations. Also, because everything is in done on one machine, you save valuable shop space. The PythonX instantly automates every structural steel fabrication in your plant.

# CAMBCO, Inc. Booth 429

Houston, TXPh: 713.781.9702 Fax: 713.781.0193

www.cambcoinc.com

The original cambering machine, since 1884. With more than 300 machines now operating in the U.S. and around the world, CAMBCO



continues to provide fabricators with the most economical method of cambering structural steel. Camber beams for \$5.00 per ton or less. The machines can also be used for straightening. Eight basic models will camber beams ranging from a W8×12 to a W40×397. Six conveyor-fed versions are also available.

# ивсо

# THE ORIGINAL CAMBERING MACHINE

# **Canam Steel Corporation**

Booth 819 Point of Rocks, MD

Ph: 301.874.5141 Toll Free: 800.638.4293 Fax: 301.874.3357

www.canam.ws

Canam Steel Corporation is a leading designer and fabricator of open web steel joists, girders, and bridging at our four U.S. plants certified by SJI, AISC, AWB, and CWB. Complex joists, including barrel, bowstring, scissor, double- and triple-pitched, and long spans up to 130 ft, are our feature products. Our joists are formed of small cold-formed channels to provide individual web members for most steel joists spanning more than 30 ft.



# **Carboline Company**

Booth 1328 St. Louis, MO Ph: 314.644.1000 Toll Free: 800.242.4645 Fax: 314.644.4617

www.carboline.com

Carboline Company offers the most in-depth product line-up for solving steel corrosion problems through protective coverings, coatings, and linings. Carboline product lines include permanent zinc primers, rapid-cure shop primers and intermediate coats, and long-term weathering finishes. Single- or multiple-coat shop-friendly systems are our specialty. Coating systems can be selected to last three months or 30 years. Stop by our booth to see how Carboline can solve your steel painting problems.

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# **Cast ConneX Corporation** Booth 503

Toronto, ON Canada

Ph: 416.978.3521 Fax: 416.978.6052

# www.castconnex.com

Cast ConneX Corporation provides cast steel structural connections for use in the steel construction industry. Cast ConneX products include a range of hollow structural section connectors for a wide variety of uses including earthquake-resistant member end connections and pin connectors for architectural use. Cast ConneX also offers design and manufacturing services for custom cast steel structural connections and components. Cast ConneX is in partnership with Atlas Tube, Inc.



# Cerbaco Ltd. Booth 913

Frenchtown, NJ Ph: 908.996.1333 Fax: 908.996.0023 www.cerbaco.com

Cerbaco will provide samples from its line of 500+ configurations of non-metallic weld backings that permit finished-quality, full-penetration welds from one side. Where one-sided welding is not desirable, the backings eliminate the need for arc gouging or heavy grinding prior to second-side welding. The company specializes in furnishing custom configurations and formulations. Technical assistance and free custom design services will be offered.

# **Chatham Steel Corporation**

Booth 519

Savannah, GA Ph: 912.233.5751 Toll Free: 800.800.1337 Fax: 912.044.0236

www.chathamsteel.com

Chatham Steel Corporation serves more than 3.000 customers throughout the Southeast from its five strategically located service centers. Chatham stocks a breadth and depth of product lines for full-line service. Primary product lines include carbon, stainless, aluminum, high-strength, and alloy steel. Our complete in-house processing capabilities include plasma and flame shape burning and beveling, shearing and bending, sawing, drilling, and more.

# **Chicago Metal Rolled Products**

Booth 832

Chicago, IL

Toll Free: 800.798.4504 Kansas City, MO Ph: 816.483.7575

# www.cmrp.com

Curving of every size of angle, bar, channel, tee, and beam up to W44×290 the hard way (x-x axis) on the world's largest beam bender. Tube and pipe bending up to 20 in. OD. Tight bends (radius =  $2 \times$  pipe OD; W6×12 hard way to 14 in. inside radius) to large sweeps. Rectangular tubing up to 20 in. x 12 in. Low deformation, thin wall bending for weight-sensitive applications. Single-radius bending in one plane, as well as off-axis and multi-axis bends: multi-radius bends; true, helical coils; and plumb, circular stair stringers. Hard way, easy way, and every way in between.



# **Cleveland City Forge** Booth 929

Wellington, OH **Ph:** 440.647.5400 Fax: 440.647.4185

www.clevelandcityforge.com

Cleveland City Forge is a world leader in structural steel hardware.

Products include clevises, turnbuckles, turnbuckle assemblies, threaded rod, adjustable yokes, eyenuts, eyebolts, and rod ends.

# **Cleveland Punch & Die Company**

Booth 419 Ravenna, OH

Ph: 330.296.4342 **Toll Free:** 800.451.4342 Fax: 800.451.6877

# www.clevelandpunch.com

The Cleveland Punch & Die Company has been serving the fabricators of steel joists, bridging, and girders for over 128 years. We have developed and earned the respect of owners, developers, engineers, and general contractors in the punching industry. Original equipment manufacturers continue to trust and recommend our products to meet and surpass our customers' expectations. We are convinced that the tradition and reliability we have built in manufacturing punches, dies, and shear blades will lead to future opportunities for another 128 years. Who else can still say that?

# **Combilift USA**

Booth 504

Greensboro, NC Ph: 336.378.8884 Toll Free: 877.COMBI56 Fax: 336 378 8842 www.combilift.com

The Combilift is an engine-powered 4-directional forklift designed primarily for handling long loads in confined areas. Suitable for use both inside and out, the machine can operate in aisles as narrow as 80. The fully synchronized 4-way steering system provides excellent maneuverability. Capacities range from 5000 lb to 30,000 lb with a variety of attachments to cater to individual customer requirements.

Booth 413

White Marsh, MD Ph: 410.933.8500 Fax: 410.933.1600 www.comea.com

Exclusive distributor of world-renowned metal fabricating machinery including GEKA single- and dual-cylinder ironworkers and CNCcontrolled punching and shearing systems; ROUNDO angle- and plate-bending rolls; Americor plate-bending rolls, PRIMELINE and ADIRA press brakes and shears, and much more.

# Commercial Metals Company (CMC)

Booth 707 Seguin, TX

Ph: 830.372.8200 Toll Free: 800.227.6489

# www.cmc.com

Since 1915. Commercial Metals Company and subsidiaries have manufactured, recycled, and marketed steel and metal products, related materials, and services through a network including steel mini-mills, steel fabrication and processing plants, constructionrelated product warehouses, a copper tube mill, metal recycling facilities, and marketing and distribution offices in the U.S. and in strategic international markets.

# Computers & Structures, Inc.

Booth 919

Berkeley, CA **Ph:** 510.649.2200 Fax: 510.649.2299 www.csiberkeley.com

Computers & Structures, Inc. specializes in structural and earthquake engineering software. CSI products, which include SAP2000, ETABS, SAFE, and PERFORM 3D, are used in leading engineering firms in more than 160 countries worldwide. From simple building structures to complex long-span bridges, CSI products do it all with an unmatched balance of practicality and sophistication. For over 30 years, they have set the industry standard for innovation, productivity, and integration.

# Controlled Automation, Inc.

Booth 237

Bryant, AR Ph: 501.557.5109 Fax: 501.557.5618

# www.controlledautomation.com

Controlled Automation is a privately owned company founded in 1986. Our core business is the manufacturing of machines and control systems for supply to the structural steel fabrication industry. In addition, we are well known for rebuilding and retrofitting machine tools of other manufacturers. We are proud to claim that we are the ONLY 100% truly American company manufacturing this equipment in the world.

exhibitors



# CoreBrace, LLC Booth 1321

West Jordan, UT Ph: 801.280.0701 Fax: 801.280.3460

# www.corebrace.com

CoreBrace is a manufacturer of proprietary buckling restrained braces. These unique structural steel braces have been independently tested and implemented in numerous buildings. The Core-Brace technology is technically superior, more cost-effective, and more readily available than other seismic restraint systems.

# **Corus International Americas**

Booth 733

Schaumburg, IL Ph: 847.619.0400 Toll Free: 800.542.6244 Fax: 847.619.0468

# www.corusnorthamerica.com

Corus is one of the world's largest steel producers and a leading manufacturer of structural shapes. Corus also provides many innovative steel construction solutions such as Slimdek, Bi-Steel, and a large size range of cold- and hot-finished HSS products. Corus International Americas specializes in providing product and service packages to contractors and designers throughout the world, blended with industry knowledge and expertise that is specific to North, Central, and South America.

# **Creative Engineering Services**

Booth 1024

Metuchen, NJ **Ph:** 732.662.4532 Fax: 732.601.4845 **Toll Free Fax:** 866.860.8113

# www.crenser.com

Creative Engineering Services provides steel detailing and connection design services. We take the responsibility of providing our customers with a professional engineer (P.E.) stamp and seal when the job requires it. Using Tekla Structures for 3D modeling, we provide customized shop drawings to our customers. CES combines today's technology with the detailing trade to improve productivity for many fabricators. Our project managers bring many years of fabrication and erection experience to make your project fit perfectly on-site.

# CSC, Inc. Booth 600

Chicago, IL **Ph:** 877.710.2053 Fax: 312 321 6489

# www.cscworld.com

CSC, supplier of the increasingly popular TEDDS calculation software, is pleased to announce the release of a brand-new software application for the design of structural steel buildings in North America, Visit Booth 600 to find out more about this exciting new product called Fastrak Building Designer.

# DAITO U.S.A., Inc.

Booth 224

Elk Grove Village, IL **Ph:** 847.437.6788 Fax: 847.437.6789

# www.daitousa.com

DAITO is focused on metal cutting and drilling machines and has become the most technologically advanced machine producer in its field. Along with being the world's top manufacturer in its field, DAITO is geared towards customer satisfaction by supporting our customers with our knowledgeable and responsive sales personnel.

# exhibitors

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# **Delta Structural Steel Services Group**

Booth 604 Idaho Falls, ID

**Ph:** 208.528.6110 Fax: 208.529.5621 www.degroup.com

Delta Structural Steel Services was established in 1991 to meet the detailing and engineering needs of local steel fabricators and erectors. Since 1991, Delta has expanded its customer base across the country, from Alaska to South Carolina. Delta uses state-of-the-art computer technology, including SDS/2 software, to provide accurate detailing and design to our customers, while striving to lower the overall project costs. Delta's projects are as varied as the Arizona Cardinal Stadium to wastewater facilities and range in size from 50 tons to 2,400 tons.

# **Design Data**

Booth 601 Lincoln, NE **Ph:** 402.441.4000 Toll Free: 800.443.0782 Fax: 402.441.4045 www.sds2.com

Design Data's SDS/2 Steel Detailing System is a three-dimensional computer modeling software product designed for the structural steel industry.



# **DetailCAD** Booth 1228

Whitefish, MT **Ph:** 406.862.7906 www.detailcad.com

DetailCAD is an AutoCAD-based steel detailing software package. DetailCAD has the ability to accept input as framing plan data to be used in generating details and a 3D model, or you can do piece-by-piece input for those smaller jobs. Both methods will generate remarkably clear and concise shop details. You can download another one of our products, the DetailCAD Genie, for free at our web site. The Genie is very useful software for detailers and engineers alike. It has a complete data base of all member shapes and their properties, plus many other utilities needed in the steel industry. Even if you don't need detailing software, you need to look at the Genie!

# **Detailed Design Drafting Services Ltd.** Booth 827

Parksville, BC

Canada Ph: 250.248.4871 Fax: 250.248.4826

# www.detaileddesian.com

Detailed Design Drafting is an industry leader in structural steel detailing. We utilize Tekla Structures detailing software. We currently have 105 staff and have detailed a wide variety of projects including design-build projects, coal boilers, gas plants, international airports, hospitals, schools, and transit buildings. We offer all data for fully automated shops including .kss files, CNC data, point-to-point lists for bolts, and many custom reports for the shop

# **Dowco Consultants Ltd.**

Booth 719 Surrey, BC Canada

Ph: 604.606.5800 Toll Free: 866.773.6926

#### Fax: 604.574.3827 www.dowco.com

Fabrication shops and engineering firms all over the world rely on Dowco Consultants Ltd. for preconstruction, detailing, 3D modeling and connection design services. In just under 40 years, Dowco Consultants has grown from a three-man operation in Vancouver, Canada to become one of the larg-



est fully automated steel detailing companies in the world. Founder Hugh Dobbie attributes this success largely to the ability to recognize change and to embrace new processes and technologies early. The company currently employs more than 250 people in five offices across Canada and one in Kolkata, India. In 1998, Dowco received ISO 9001 certification, and the quality management system is an integral part of daily routine.

#### Eastern Pneumatics & Hydraulics, Inc./McCann **Equipment Ltd.**

Booth 1334 Salem, NH **Ph:** 603.893.7662 Toll Free: 800.356.5624 Fax: 603.893.7745

# www.ephtools.com

Specializing in steel erectors' torque-related tools. Tone TC shear tools and a complete line of electric, hydraulic, and pneumatic torque wrenches, Skidmore torque tension testers, erectors reamers, drift pins and structural wrenches. Repairs, rentals, sales, calibrations, and certifications to ISO 17025 Standards.

# Elliot/AmQuip (The Crane People)

Booth 1407 Bensalem, PA

**Ph:** 215.639.9200 **Toll Free:** 800.355.9200 Fax: 215.639.9209

www.amquip.com Serving the U.S. with tower cranes, luffing tower cranes, large hydraulic truck cranes, rough- and all-terrain conventional truck tower cranes, and crawler cranes, as well as boom truck rentals. From 6 to 550 tons, bare or manned with licensed operators. On a daily, weekly, monthly, or longer basis.

# **ESAB Welding and Cutting Products** Booth 907

Florence, SC

Ph: 843.669.4411 **Toll Free:** 800.ESAB.123 Fax: 843 664 4258

**Toll Free Fax:** 800.634.7548

With over 100 years of experience, ESAB offers the equipment, filler metals, technical support, and global resources to provide complete solutions for your welding and cutting needs. For the bridge and steel fabrication industry, combine Coreshield self-shielded flux core wires wire with an ESAB 653cvcc power source and a Mobilemaster wire feeder for a hard-working, reliable package. Time after time, weld after weld, ESAB brings you products that meet your precise specifications. Great things happen when you put us to work.

# Fabreeka International, Inc.

Booth 508

Stoughton, MA **Ph:** 781.341.3655 **Toll Free:** 800.322.7352 Fax: 781.341.3983 ww.fabreeka.com

Fabreeka's experience in vibration control includes the dynamic response of steel fabrications and support structures. Services include measuring building floor vibration, displacement response of floors/mezzanines, and modeling of structures to predict performance. Fabreeka's capabilities include NASTRAN and finite element analysis programs to analyze the static and dynamic conditions of our customers' vibration problems.

# FabSuite, LLC

Booth 1112 Williamsburg, VA **Ph:** 757.645.0842

Fax: 757.645.0896 www.FabSuite.com

FabSuite hosts a collection of steel management software programs to help efficiently organize your business. FabSuite offers customizable programs to meet your needs at every stage of the steel fabrication process. The programs included are: Estimating, Project Management, Production Control, Combining, Inventory Control, Purchasing, and Order Entry. Each program can be customized to meet your specific needs as an individual company, and can be easily integrated into your existing company's job procedures. The software assures a smooth and continuous flow of information from a project's inception all the way through its final completion and job-costing. FabSuite invites you to stop by

the booth for a free, personal demonstration of how this program can go to work for your business today.

# FabTrol Systems, Inc.

Booth 809 Eugene, OR Ph: 541.485.4719

Fax: 541.485.4302 www.fabtrol.com

FabTrol MRP is the global leader in steel fabrication management software. With integrated estimating, drawing management, material management, production control, and shipping, FabTrol MRP automates the steel fabrication process, FabTrol MRP was designed by steel fabricators for steel fabricators, and is proven to help increase revenues, reduce costs, improve quality, and shorten project schedules.

# Faccin USA, Inc.

Booth 523

Tampa, FL Ph: 905.335.9903 Fax: 905.340.0148

www.faccin.com

World leader in the production of heavy-duty bending rolls for plate and structural shapes, as well as dish head lines.

# **Ficep Corporation**

Booth 108

Forest Hill, MD Ph: 410.588.5800 Fax: 410.588.5900

www.ficepcorp.com

Ficep manufactures and sells the world's largest CNC product line for the fabrication of structural steel and plate, with over 65 different offerings. In addition to this comprehensive product line, Ficep also offers an extensive range of integrated software packages to enhance the productivity of the CNC systems. This ranges from nesting to an interface that permits a user to import from the 3D model, not just the cut length and hole locations from Tekla, but also all the layout locations for detail placement, automatically.

# **Fisher & Ludlow Grating Products**

Booth 1305

Florence, KY **Ph:** 859.282.7767

Toll Free: 800.334.2047 Fax: 859.282.7702

www.fisherludlow.com Fisher & Ludlow is a full-line manufacturer of bar grating, safety grating, and expanded metal products. Our 10 locations provide rapid delivery of both standard panels and custom gratings that are fabricated specifically for your project. Fisher & Ludlow manufactures bar grating in more North American locations than any other grating company, ensuring timely delivery to your jobsite, where ever it is located

# G.W.Y., Inc

Booth 1313 Greenfield, NH Ph: 603.547.3800 **Toll Free:** 888.838.6500

Fax: 603.547.3801

www.gwyinc.com

G.W.Y., Inc. is celebrating its 33rd year of distributing installation tools for structural bolting. G.W.Y. has a full line of installation wrenches for both TC bolts and standard structural bolts. Like the TC wrenches, G.W.Y.'s installation wrenches for heavy hex head structural bolts are constant-speed electric tools, which allows the bolts to be tightened from one side by one person. The new Turn of Nut Installation Wrench automatically shuts down when the preset degree of rotation is reached. In addition to new wrench sales, G.W.Y. also rents installation tools, G.W.Y.'s extensive spare parts inventory enables us to provide same-day service for most tool repairs.

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# exhibitors

# **Gaule Detailing** Booth 1006

Creston, IA **Ph:** 641.352.5334 Fax: 641.352.5335

# www.gauledetailing.com

Gaule Detailing has served the steel industry for 27 years. We have a quality driven staff of 12 who will detail your projects. The types of projects we prefer are industrial and commercial. However, we find ourselves doing all sorts of things. In general, we like to stick with projects that are at least 70% structural. Many times, we can convert the engineer's model into our system and get a head start on your project.

# Genesis Quality Systems, Inc.

Booth 625 Orion, MI **Ph:** 248.377.1788 Fax: 248.377.4588 www.aenesisas.com

GQS currently provides detailing management, project quality management, pre-construction, and construction services, and develops process management systems for many clients in the steel industry. Our clients include accreditation bodies, code providers, construction managers, general contractors, engineers,

fabricators, and inspection agencies.

#### Gerdau Ameristeel

Booth 932 Midlothian, TX

Ph: 800 527 7979 Fax: 972.779.1236

# www.gerdauameristeel.com

Gerdau Ameristeel is helping to shape the world as a leader in the steel industry in production, service, and quality. We manufacture a diverse and balanced mix of recycled steel products for use in a variety of industries including construction, cellular and electrical transmission, automotive, mining, and equipment manufacturing.



# Girder-Slab Technologies, LLC

Booth 833 Cherry Hill, NJ **Ph:** 856.424.7880 **Toll Free:** 888.478.1100 Fax: 856.424.6880 www.girder-slab.com

Recipient of the 2007 AISC Special Achievement Award, Girder-Slab Technologies has continued to make great strides in bringing the Girder-Slab System to the multi-story residential market throughout all of North America. This technology is offered only through steel contractors and is ideal for design-build. The steel contractor should think of this as their system, and Girder-Slab Technologies as their national representative, supplying everything needed to promote the system, while continuously educating more architects, engineers, and owners about Girder-Slab each day

Graitec, Inc. Booth 1001

Laval, QC Canada

Ph: 877.464.3366 Toll Free: 877.464.5046 Fax: 450.628.0400 www.graitec.com

Graitec is one of the largest worldwide developers of structural construction software. Advance-Steel is used by design professionals, detailing offices, and steel construction companies that require a comprehensive and completely integrated package in AutoCAD. Advance is a high-end, yet user-friendly, affordable 3D solution that automates the entire design process (engineering, detailing, and erection drawings, various reports, etc.) and produces CNC fabrication drawings and code in AutoCAD.

# **Grating Fasteners, Inc.**

Booth 1303 Harvey, LA **Ph:** 504.361.3471 **Toll Free:** 800.227.9013 Fax: 504.361.9059

www.aclips.com

Grating Fasteners, Inc. specializes in manufacturing and distributing the G-Clip line of grating clips, which are used to fasten

bar grating to structural members. Our G-Clips are designed to be installed from above the grating surface quickly, easily, and economically. With G-clips, power tools are not needed for installation, as they can be installed with simple hand tools. Certain G-Clips feature materials that resist damage in highly corrosive

#### **Groupe CADmax**

Booth 629 Montreal, QC Canada

**Ph:** 514.323.0713 Toll Free: 877.477.0713 Fax: 514.323.9091

# www.groupecadmax.com

Groupe CADmax is second to none in consulting and shop detailing services for miscellaneous, ornamental, and architectural metal works in North America. An experienced team of draftsmen, checkers, and designers is at your service to provide high-quality shop drawings at reasonable costs, always delivered according to your schedule. Please visit our sales representative in booth 629 to find out how we can assist your team and/or add to your present external detailing force.

#### Hare Information Technolgy Solutions Pvt. Ltd. Booth 1329

Seevaram, Perungudi Chennai

India

**Ph:** 91.44.3915.0050 Fax: 91.44.2496.3401 www.hits.net.in

Hits—Hare Information Technology Solutions Private Ltd.—is a company of William Hare Ltd. in the UK, a £200 million company servicing worldwide customers for over 60 years. Some of our strongest product offerings are: (a) very flexible and easily customizable business process automation software, (b) a comprehensive document management solution (c), Engineering Helpdesk and (d) IT helpdesk systems. Hits will be a one-stop solution for all your software requirements, services, consulting, and outsourcing

# Haydon Bolts, Inc. Booth 724

Philadelphia, PA Ph: 215.537.8700 Fax: 215.537.5569

# www.haydonbolts.com

Haydon Bolts, Inc is a 144-year-old leading manufacturer and distributor of all kinds of structural bolts and electric tools to the heavy steel and concrete construction industries. Haydon also manufacturers large-diameter (% in. to 21/2 in.) hot forged headed bolts of all grades as well as bent anchor rods and rod and plate anchors. Haydon operates out of its 40,000-sq.-ft manufacturing and distribution facility in Philadelphia, Haydon is a charter member of the Industrial Fastener Institute (IFI), the trade organization of the leading fastener manufacturers in North America, as well as an associate member of AISC.

# High Steel Structures, Inc.

Booth 1126 Lancaster, PA

Ph: 717.207.4303 Fax: 717 399 4102

www.highsteel.com

Lancaster, Pa.-based High Steel Structures, Inc. is one of the largest fabricators of structural steel in the U.S. AISC Certified for major bridges and buildings, High Steel fabricates a wide range of steel plate components for transportation, building, industrial, and manufacturing projects. The company welcomes requests from steel fabricators and erectors for supplemental fabrication of heavy building components, such as plate girders, crane steel, and building frames.

# Hilti

Booth 1107

Tulsa, OK

**Ph:** 800.879.8000 **Toll Free:** 800.879.5000 Fax: 800.879.7000

# www.us.hilti.com

Hilti is the global leader of quality, innovative products and services for engineering and construction professionals, focusing on the needs of steel fabricators and erectors with over 50 engineers and 1,000 trained salespeople in the U.S. and Canada, with others in more than 120 countries. Call now for design software, free submittals, design, and install

training for metal decking with mechanical fastening as well as anchor or powder-actuated safety training and custom CEU

# Hodell-Natco Industries, Inc.

Booth 1125 Houston, TX **Ph:** 713.856.6800 Toll Free: 800.275.2658 Fax: 713.856.6849 Toll Free Fax: 800.994.2678

www.hodell-natco.com

For more than 120 years, Hodell Natco Industries has serviced the fastener and chain industries. We have eight strategically located warehouses that encompass more than 500,000 sq. ft. of warehouse space. We specialize in ASTM A325/A490 structural bolts, but also offer a full assortment of construction related fasteners. Our diverse inventory consists of a complete line of hot-dip galvanized, mech.-galvanized, and zinc-plated fasteners, with sameday delivery. All of our products are available in both import and domestic materials, with complete mill test reports available.

# Holtec Consulting Private Ltd.

Booth 1136

Gurgaon, Haryana

India

**Ph:** 91.124.4693200 Fax: 91.124.4693103

# www.holtecnet.com

Holtec is an ISO-9001 certified engineering and detailing company with more than 500 professionals. From its main engineering center in India, it offers a wide range of services in civil/structural, mechanical, electrical engineering and detailing to its customers, who are located in more than 67 countries. Its structural steel detailing group uses Tekla Structures, SDS/2, and AutoCAD to cost-efficiently detail projects ranging from 50 to 30,000 tons for leading U.S. and Canadian fabricator

# Hougen Manufacturing, Inc.

Booth 501 Swartz Creek, MI Ph: 810.635.7111

**Toll Free:** 800.426.7818 Fax: 810.635.8277

# www.hougen.com

Hougen Manufacturing produces a full line of portable magnetic drills, Rotabroach annular cutters, and other hole-making products for use in fabrication, production, and maintenance applications. Hougen's products are for use on-site or in the shop to help make holes easier, faster, and safer.

# **Identity Links**

Booth 1410 Skokie, IL

Ph: 847.329.9700 Toll Free: 888.282.9507 Fax: 847.329.9797

# www.identity-links.com

We are a distribution company that specializes in promotional products geared toward the architectural, construction, and engineering industries. We will be representing as well as exhibiting drafting and architectural products and tools by manufacturers such as Alumicolor and Woodrow Engineering. We also carry a full line of cutom-imprintable corporate and work apparel.

# Indiana Gratings Pvt. Ltd.

Booth 1300

Naka, Andheri East, Mumbai

India

Ph: 91.22.28504743/28505857 Toll Free: 91.22.28505154

www.indianagroup.com

Indiana Gratings Pvt. Ltd. is a part of Indiana Group, which is located in India. It has an experience of almost four decades in the field of manufacturing and exporting of bar gratings, cable trays, and cable ladders to various countries in the world. Indiana Gratings Pvt. Ltd. is approved by most of the leading companies in the world and has experience of working with companies such as Bechtel, KBR, Cheveron, Siemens, F L Smith, Foster Wheeler, GASCO, and Saudi Aramco.

# exhibitors

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# **Industrial Galvanizers America**

Booth 1235 Petersburg, VA Ph: 804.733.0808

Fax: 804.733.2274

Industrial Galvanizers America (IGA) is a supplier of high-quality hot-dip galvanizing. IGA has five plants conveniently located throughout the southeastern US. Your steel is galvanized



according to the IGCMS, IG America's own compliance management system, based on three international standards. Visit us for more information about IGA, your best choice for highquality galvanizing, fast turn times, and responsive customer



# STREET IN COMPLIANCE **MANAGEMENT** ☑ Environment ☑ Health and Safety

# Infasco

Booth 1301

Marieville, QC Canada

**Ph:** 450.658.8741 Fax: 450.447.0114 www.infasco.com

Infasco's vertically integrated manufacturing process encompasses all aspects of fastener production. Annealing, pickling, cold forming, and heat treating are all conducted at Infasco's 800,000-sq.-ft Marieville plant. Infasco operates an accredited ISO 17025 lab and is ISO 9001-2000 registered. Infasco manufactures a variety of fasteners, including hex head cap screws in Grades 2, 5, and 8, as well as structural fasteners including ASTM A325, A490, F1852 tension control bolts, and heavy hex structural nuts.

# InfoSight Corporation

Booth 606

Chillicothe, OH **Ph:** 740.642.3600 Fax: 740.642.5001 www.infosight.com

InfoSight provides solutions with their tags, products, and systems for on-line, automatic product marking along with manual identification for various industries including steel, fabricators, galvanizers, power plants, automotive, etc. Reliable identification of products through company processes is essential. InfoSight has an unique tagging system that survives hot-dip galvanizing. We BARCODE Difficult Stuff.

# Infra-Metals Company

Booth 401

Langhorne, PA Ph: 800.899.3432 Fax: 215.741.5973 www.infra-metals.com

Infra-Metals is a distibutor of structural steel products, plate, tube, and mini-mill products. Processing capabilities include sawing, burning, tee-splitting, and cambering. Locations in Wallingford, Conn., Marsailles, III., Baltimore, Md., Petersburg, Va., Tampa, Fla., and Hallandale, Fla. Contact the nearest sales office for more information.

# **International Design Services**

Booth 1307

Maryland Heights, MO Ph: 314.872.1791 Fax: 314.872.8531 www.ids-inc.net

IDS is dedicated to delivering the highest quality detailing and connection design services. All of our shop drawings and calculations are produced under the supervision of licensed professional engineers. We produce CNC DXF DSTV and KSS files for 100% of our work. IDS currently employs more than 200 detailers, connection engineers, and support staff. Eleven of our detailers are NISD certified. We detail using AutoCAD and Tekla Structures.

#### International Paint, LLC Booth 1206

Houston, TX Ph: 713.682.1711

Fax: 713.684.1514 www.international-pc.com

International Paint, LLC is a leading global provider of high-performance coatings products for over 25 years. International Paint offers an extensive range of high-performance coatings for the oil, gas, chemical processing, power, paper and pulp, rail, steel structure, mining, and marine industries.

#### Intsel Steel Distributors/R&S Steel/Alta-Steelco: divisions of Triple-S Steel Supply Company Booth 908

Houston, TX **Ph:** 713.937.9500 **Toll Free:** 800.762.3316 Fax: 713.937.1091

# www.intselsteel.com

Intsel Steel Distributors, R&S Steel, Alta-Steelco and their parent company, Triple S Steel, are committed to the steel industry in providing the range and grades of material from stock to facilitate your immediate and long-term requirements. Offering expertise from years of service, our employees accept the challenge to compete in the ever-changing world dynamic. Stocking over 150,000 tons in a full range of structurals, plate, and tubing, our processing services including flame-cutting, sawcutting, blasting and painting, bending, forming, slitting, edgeconditioning, plate-punching, and leveling. Our 600 dedicated staff serve customers in the U.S. and around the world from plants located in Texas, Colorado, Utah, and Tennessee.

# **Ironworker Management Progressive Action** Cooperative Trust (IMPACT)

Booth 626 Washington, DC

Ph: 202.393.1147 Toll Free: 800.545.4921 Fax: 202.393.1507 www.impact-net.org

IMPACT is a Labor Management Taft Hartley Trust, whose primary mission is to expand opportunities for union ironworkers and their signatory contractors through progressive and innovative labor management cooperative programs.

# ISD - International Steel Detailing

Booth 1010 Nunoa, Santiago

**Ph:** 56.2.4843100 Fax: 56.2.4843199

# www.isd.cl

ISD - International Steel Detailing is company with over 20 years of experience in projects for different markets such as mining & metals nower infrastructure commercial and many others. Our highly experienced staff, rigorous quality control procedures and the latest steel detailing technology we work with, including SDS/2 and Tekla Strucutres software, allow us to quarantee the success of any project.

# J. B. Long, Inc. Booth 914

Fleetwood, PA **Ph:** 610.944.8840 Fax: 610.944.0789

www.jblong.com

J. B. Long, Inc. has supplied structural steel and miscellaneous iron details to the fabrication industry for over 20 years. The firm is certified under the NISD Quality Procedures Program (QPP) . All those qualified of the total staff of 25 are certified under the NISD Individual Detailer Certification program (IDC). J. B. Long, Inc. uses SteelLogic and Tekla Structures to create details. The focus is on

small to mid-sized structural and miscellaneous iron projects

# Jobber Instruments Calculator Company

**Booth 1227** 

Sevierville, TN Ph: 865.428.6517 Toll Free: 800.635.1339 Fax: 865.453.0202 www.jobbercalculator.com

Our contribution to the steel fabricating industry for 25 years has been to develop calculators that meet its special needs. Our latest model is the Jobber 6, which is the most advanced and easy-to-use dimensional calculator ever developed. It is filled with programs for automatically solving almost any math problem. It's value has been attested to by thousands of loyal users. These include detailers, CAD users, checkers, estimators, engineers, and even shop personnel. Once you use a Jobber, you won't be able to do without it.

# K Detailing, Inc. Booth 1138

Brooklyn, NY Ph: 718.236.0565 Fax: 718.236.0589

# www.kdetailing.com

Our objective is to incorporate the latest steel detailing software, including but not limited to, AutoCAD, SDS/2, and traditional shop drawings furnished by hand, to provide our clients with a quality product and service that will continually exceed their expectations. We at K Detailing, Inc. understand that your final product is only as good as ours. We use our education, vast experience, and specialized tools to provide you with the most accurate and highest quality shop drawings possible.

# Kee Safety, Inc.

Booth 1139 Buffalo, NY Ph: 716.896.4949

Toll Free: 800.851.5181 Fax: 716.896.5696

# www.keesafetv.com

The Kee Safety Group of global companies, formerly known as Kee Klamp Ltd., is one of the world's leading safety solutions suppliers. We have been providing solutions for railings, barriers, perimeter protection, fall prevention, and many other applications since 1934. From roof edge fall protection and guard railing to protection barriers, machine guards, and shop fixtures to children's playgrounds. Kee Safety has supplied the answer to many problems with safe, reliable, cost-effective, and durable solutions.

# **KIP America** Booth 1239

Novi, MI

Toll Free: 800.252.6793 **Toll Free Fax:** 800.672.1400 www.kipamerica.com

KIP is a major manufacturer of copying, printing, and scanning systems for monochrome and color technical documents up to 36 wide. KIP wide-format digital imaging systems deliver high-speed output, low-cost operation, and all-in-one functionality for a wide range of applications.

# Kottler Metal Products, Inc.

Booth 941

Willoughby, OH **Ph:** 440.946.7473 Toll Free: 800.678.0808 Fax: 440.946.7655

www.kottlermetal.com

Established in 1915, Kottler Metal Products, Inc. rolls pipes, HSS, and structural shapes. A new facility and experienced craftsmen allow Kottler Metal to supply customers with one of the largest bending capacities in the U.S. Kottler rolls up to 48 in. channel and I-beam, easy/hard way, 20 in. pipe tube, rail, pipe, and tee with minimal distortion

# Kubes Steel, Inc.

Booth 641

Stoney Creek, ON Canada

Ph: 905.643.1229 Toll Free: 877.327.8357 Fax: 905.643.4003

# www.kubesteel.com

Kubes Steel, Inc. is Canada's premier provider of structural, section rolling, forming, and prefabrication services. We offer Canada's largest multi-section roll and specialized section bending capacity. We can form sections to 40 in. both ways and tube to 42 in. diameter, which is among the best in North America. We offer ISO quality assurance and have provided services to many of North America's preeminent fabricators. Call us to help you make your next project take shape.



# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

**LeJeune Bolt Company** Booth 1200

Burnsville, MN Toll Free: 800.872.2658 Fax: 952.890.3544 www.lejeunebolt.com

Get Exactly What You Need. Our inventory is the most comprehensive in the industry, ensuring high fill rates for orders of any size. When You Need It. We provide same-day shipment from multiple locations, with custom packaging and electronic certifications. With Complete Satisfaction. We are a key supplier to some of the most recognizable and significant projects in the world. Our lines include structural fasteners, tools and equipment, anchors/threaded rod. stud welding products/equipment, and industrial/OEM fasteners.

#### **Lincoln Electric**

Booth 926 Cleveland, OH **Ph:** 216.481.8100 Fax: 216.486.1751 www.lincolnelectric.com

The Lincoln Electric Company, headquartered in Cleveland, Ohio, is the world leader in the design, development, and manufacture of arc-welding products, robotic arc-welding systems, and plasma and oxyfuel cutting equipment, and has a leading global position in the brazing and soldering alloys market.

#### Lincoln Structural Solutions

Booth 609 Lincoln, NE

**Ph:** 402.464.4433 **Toll Free:** 800.571.6884 **Fax:** 402.464.4855

# www.lincolnstructural.com

Lincoln Structural Solutions is a commercial and nuclear structural steel and fastener supplier. ISO 9001:2000 registered and compliant to ASME Section 3 NCA-3800, ANSI N45.2, NQA-1, 10 CFR 50 Appendix B, and 10 CFR 21. Our fastening systems include structural bolts, nuts, and washers, tension-indicating fasteners, hex head cap screws, anchors, and threaded rods. Full certification and rotational capacity tests are offered at no cost. Custom labeling provided to customer specification.

# Lindapter North America, Inc.

Booth 1027 Ann Arbor, MI

Toll Free: 888.724.2323 Fax: 734.677.2339 www.lindapterna.com

Lindapter is the recognized world leader in the steel connections market. The Lindapter method of connecting to or from structural members can be adapted to suit almost any steel to steel connection application. With over 70 years of experience, Lindapter has a proven solution any steel connection challenge. Service, advice, and support are the extras we provide with our innovative products. Notify us, and our engineering staff will design your connection and provide you with a fully designed connection.

# Lohr Structural Fasteners, Inc.

Booth 1010

Humble, TX Ph: 281.446.6766 Fax: 281.446.7805 www.lohrfasteners.com

Stop by Lohr Fasteners booth and see the patented Lohr SMART-HEX TC, the Thick Washer Face 11/8 A490 SMARTHEX, and our newest product, the Lohr Hex Traceables-all with our exclusive Head ID Code. At Lohr, we are committed to total customer support. Let our experienced staff help ensure that your next project goes smoothly. Look for the motorcycles and stop by to see why Lohr Fasteners is the leader in tension-control fasteners.

# LS Industries

Booth 427

Wichita, KS **Ph:** 316.265.7997 **Toll Free:** 800.835.0218 **Fax:** 316.265.0013

# www.lsindustries.com

LS Industries offers engineering, design, and manufacturing of blast cleaning equipment. Working with you and your engineers, LS can provide innovative solutions that meet your cleaning requirements and integrate well with your manufacturing systems. Quality, combined with craftsmanship, makes LS Industries a leader in blast cleaning manufacturing. Our blasters are low-maintenance, long-lasting, and cost-efficient to operate. An extensive parts department is our commitment to the customer.

Booth 1225 West Salem, WI Ph: 608.784.2300 Fax: 608.785.2003

# www.ltcsteeldetailers.com

LTC, Inc is an innovative, progressive structural steel detailing company that has provided quality shop drawings to the fabrication industry since 1985. Our current staff of 15 detailers utilizes Tekla Structures to prepare shop drawings for commercial projects including hospitals, stadiums, high-rise structures, multi-story office buildings, schools, airports, churches, and industrial buildings. We offer all electronic data necessary for fully automated shops, including kiss, CNC, DXF, and plate duplicator files. Stop by Booth 1225 for more information.

# Madden Bolt & Galvanizing

Booth 1240 Houston, TX

Ph: 713.939.9999 Toll Free: 800.375.2658 Fax: 713.939.7200 www.maddenbolt.com

Celebrating 20 years in 2008, Madden Bolt & Galvanizing is renowned for their exceptional quality and noteworthy performance history within the transportation, gas pipeline, industrial, and steel structure industries. Specializing in custom threaded products such as anchor bolts, u-bolts, j-bolts, plate bolts, and threaded rods, Madden Bolt and Galvanizing handles orders as small a one piece to as large as several thousand. We love demanding customers!

# Marubeni-Itochu Steel America, Inc. (MISA)

Booth 502 New York, NY Ph: 212.450.0333 Fax: 212.450.0790 www.misteel.com

Marubeni-Itochu Steel America, Inc. (MISA) is a fully integrated network of subsidiary and affiliated processing facilities and sales and service offices strategically located in the U.S., Canada, and Mexico with liaison offices in South America. At MISA we are dedicated to understanding and exceeding your needs and expectations for effective, responsive, and dependable quality, delivery, and service. MISA is committed to being the best and most innovative metal supply chain solution.

# Metal Dek Group, a unit of CSi **Booth 1219**

Columbia, SC

**Ph:** 803.771.7920 Fax: 803.744.6189 www.csisteel.com

Metal Dek Group, a unit of CSi, continues to specialize in partnering with the design community to provide Engineered Solutions. Curve-Dek, Deep-Dek Composite, Access Panels, and Rhino-Dek are examples of extraordinary solutions MDG has introduced to the marketplace. The Dek-Selector feature, along with technical information, is available 24/7 at www.metaldek.

# **Metals USA**

Booth 608

Langhorne, PA **Ph:** 267.580.2100 Toll Free: 800.523.3340 Fax: 267.580.2121

# www.metalsusa.com

Metals USA inventories, processes, and distributes structural steel products throughout the U.S. Material grades supplied include ASTM A992, ASTM A572, ASTM A588, ASTM A500, and ASTM A36. Our inventories of shapes, bars, plates and hollow structural members are commonly used in building and bridge applications. Services include cutting to length, tee splitting, cambering, forming, connection materials, and project management. Metals USA inventories, combined with tailored services and know-how, provide steel fabricators with supply solutions supporting schedule requirements.

# MG Systems & Welding, Inc.

Booth 541 Menomonee Falls, WI

Ph: 262.255.5520 Fax: 262.255.5170

www.mg-systems-welding.com

MG Systems & Welding, a part of the Messer premier manufacturer of CNC thermal cutting machines. Using plasma and oxyfuel



exhibitors

MG Systems & Welding, Inc.

torches, MG machines cut parts from mild steel, stainless steel, and aluminum. In addition, we provide hole drilling capability on our machines. Our customers prefer MG Systems because we provide a full range of equipment, service, and maintenance. All machines are designed and built in our Wisconsin plant. Want to know more? Go to our web site to see our cutting machines, tables, and options. What can we build for you?

# **Mi-Jack Products**

**Booth 1319** Hazel Crest, IL Ph: 708.596.5200 Fax: 708.225.2312 www.mi-iack.com

Mi-Jack Products is the leader in providing equipment to the steel construction industry with unsurpassed service for over 40 years. Mi-Jack Travelift rubber-tired gantry cranes possess the precision to transport the largest prefabricated steel structures, while maintaining the durability to haul the bulkiest steel slabs. Regardless of your requirements, Mi-Jack is the solution for all of your steel handling needs.

#### **Modern Steel Construction magazine** Booth 1040

Chicago, IL

Editorial Info: 312.670.8318 Ad Sales: 231.228.2274

www.modernsteel.com Modern Steel Construction is the official publication of AISC. MSC brings its read-

ership in-depth information on the newest and most MODERN STEEL CONSTRUCTION advanced uses of structural

steel in building and bridges by focusing on innovatiove and costeffective steel designs and the products that help bring them to life. MSC is directed exclusively to professionals in the construction industry who make and influence purchasing decisions-whether they are engineers, architects, building owners, contractors, fabricators, detailers, or erectors.

# Moldtek Technologies Ltd. Booth 622

www.moldtekindia.com

Morgan U-Clamps, LLC Booth 1417

Cullman, AL Ph: 314.540.1717 Fax: 256.287.3100

www.uclamps.com

Manufacturer/distributor of U-Clamps structural hangers. U-Clamps save time and money during installation. U-Clamps secure standard necessary components (i.e., water, electricity, etc.) both horizontally and vertically to joists and I-Beams. U-Clamps have astonishing weight load capacity for standard and seismic conditions.

# **National Institute of Steel Detailing**

Booth 726 Oakland, CA Ph: 510.568.3741 **Fax:** 510.568.3781 www.nisd.org

The National Institute of Steel Detailing (NISD) is an international association that advocates, promotes, and serves the interests of the steel detailing industry. NISD is an association of unified company owners and individuals at the local, regional, and international levels. It promotes to fabricators, architects, engineers, and contractors a better understanding of the importance of detailing services in the construction process. NISD fosters a professional approach to business by advocating improved quality through member networking, education, and certification.

# exhibitors

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# **National Steel Bridge Alliance**

Booth 1038 Chicago, IL **Ph:** 606.724.2347

**Fax:** 606.724.2504 www.steelbridges.org

The National Steel Bridge Alliance is a nonprofit alliance of companies and individuals

who are dedicated to developing and promoting the best in steel bridge design and construction.

Nelson Stud Welding, Inc.

Booth 910 Elyria, OH Ph: 440.329.0400 Toll Free: 800.635.9353 Fax: 440.329.0492

www.nelsonstudwelding.com

Nelson offers new, extra-long, cold-formed shear connector and anchor studs meeting AWS, AISC, and ASSHTO specifications. They eliminate more expensive alternatives such as piggybacking or using expensive, hot-forged studs. Nelson also will demonstrate the Nelweld stud welding system. The system can monitor and/or adjust more than 30 welding parameters for the highest quality and most reliable stud welds available. The unique process monitoring will also be demonstrated, assuring a quality weld every time, with complete traceability of all welds on a project

# **New Millennium Building Systems**

Booth 1212

Lake City, FL; Florence, SC **Ph:** 260.868.6000 Fax: 260.868.6002 www.newmill.com

Striving to anticipate customer needs and proactively working to meet them is the essence of our company. We exhibit AGILITY, the physical and mental nimbleness to achieve goals, by being dynamic and personal, promoting teamwork, and living up to higher standards. We know our partners and customers count on us to be reliable and trustworthy. It is our agility, integrity, and hard work that make the difference in supplying steel joist and deck products so that we remain Flexible to the Finish.

# Nitto Kohki U.S.A., Inc.

Booth 518 Hanover Park, IL Ph: 630.924.9393

Toll Free: 800.323.8828 Fax: 630.924.0303

**Toll Free Fax:** 866.924.0303

www.nittokohki.com

Nitto Kohki is a leading manufacturer of the automatic-feed magnetic base drills that use self-regulated feed systems to optimize cutting performance with a number of safety features. Used with JetBroach tungsten carbide-tipped annular cutters, it can significantly increase production while reducing labor hours and hazardless work. We also manufacture many other steel working tools, including portable hydraulic punches, bevelers, and pneumatic and electric power tools.

# **North American Galvanizing Company**

Booth 1207 Tulsa, OK

Ph: 918.488.9420 Fax: 918.488.8172 www.nagalv.com

North American Galvanizing Company is a leading provider of coating for corrosion protection. North American Galvanizing Company currently conducts its galvanizing and coating business through a network of plants located in Canton, Denver, Houston, Hurst, Kansas City, Nashville, St. Louis, Louisville, and Tulsa, Hot-dip galvanizing provides metal corrosion protection for many product applications used in commercial, construction, and industrial markets. NAGC is headquartered in Tulsa



# **Nucor Corporation** Booth 801

Charlotte, NC Ph: 704.366.7000 Fax: 704.362.4208

Nucor and affiliates are manufacturers of steel products, with operating facilities primarily in the U.S. and Canada. Products produced include: carbon and alloy steel-in bars, beams, sheet, and plate; steel joists and joist girders; steel deck; fabricated concrete-reinforcing steel; cold-finished steel; steel fasteners; metal building systems; lightgauge steel framing; steel grating and expanded metal; and wire and wire mesh. Nucor is North America's largest recycler.





# **Nucor - Vulcraft Group**

Booth 801 Fort Payne, AL Ph: 256.845.2460 Fax: 256 845 2823

www.vulcraft.com; www.vercodeck.com

Steel joists, joist girders, composite floor joists, special profile steel joists, and floor and roof deck. Vulcraft facilities are located in South Carolina, Nebraska, Alabama, Texas, Indiana, Utah, and New York. Verco's corporate headquarters is Phoenix. Verco manufacturing facilities are located in Arizona and California.



# Nucor - Yamato Steel Company

Booth 801 Blytheville, AR Ph: 870.762.5500 Toll Free: 800.289.6977 Fax: 870.763.9107

www.nucoryamato.com

Steel manufacturer of wide-flange structural steel shapes, H-piles, sheet piling, angles, channels, and car building shapes. Grades include ASTM A36, ASTM A572, ASTM A588, ASTM A690, ASTM A709, and ASTM A992



# **Nucor Fastener Division**

Booth 801 St. Joe, IN

Ph: 260.337.1600 Toll Free: 800.955.6826 **Fax:** 260.337.1726 www.nucor-fastener.com

Manufacturer of 100% made-in-the-USA carbon and alloy steel hex head cap screws, heavy hex structural bolts, dome head Tru-Tension tension control assemblies, nuts, and build-to-print specials in inch and metric sizes in various grades, with finishes and thread coatings to meet fastening requirements



# Ocean Machinery

Booth 119

Fort Lauderdale, FL **Ph:** 954.956.3131 Toll Free: 800 286 3624 Fax: 954 956 3199

www.oceanmachinery.com

Ocean Machinery specializes in the small-to-medium fabricator, pro-

ducing unique CNC solutions to reduce labor and improve productivity and quality. Products include the Avenger CNC beam drill, Clipper CNC angle line, Liberator CNC beam coper, and Eliminator modular material-handling system and measuring device, as well as the extremely successful Ocean Penetrator drill bits for CNC drill lines. With over more than 300 installations, the Ocean Avenger is the most popular beam drill line in the USA



# **Omnitech Associates**

Booth 708

Oakland, CA Ph: 510.658.8328 Toll Free: 888.8DESCON

Fax: 510.595.0373 www.desconplus.com

Omnitech Associates develops connection design software Descon-Win and DesconBrace. ASD and LRFD versions of both programs use current AISC Specifications and are available in U.S. customary and metric units. DesconWin designs beam shear and moment connections to girders, W and HSS columns, FEMA-350 connections, beam, and column splices. DesconBrace designs seismic and non-seismic connections of Diagonal, Chevron, K, and Knee Braces. Both programs generate detailed calculation reports, drawings, and DXF files.

# **P2 Programs**

Booth 1113

Dripping Springs, TX Ph: 512.858.2007 Toll Free: 800.563.6737

Fax: 512.858.2008 www.p2programs.com

P2 Programs sets the industry standard when it comes to bar coding and tracking your structural steel. With 20+ years experience using Auto-ID technology to improve manufacturing process tracking and warehouse operations, P2 Programs is the company with the knowledge you should look to for answers. With our core products, industry contacts, and hardware suppliers, you could not make a better decision than to call us first to help solve your information roadblocks!

# Paramount Roll & Forming, Inc.

Booth 628

Santa Fe Springs, CA **Ph:** 562.944.6151 Fax: 562.941.8102

# www.paramount-roll.com

Since 1963, PR&F has provided structural steel rolling, forming, and

bending for aerospace, architectural, industrial, transportation, and commercial uses. We bend tubes, pipes, channels, beams, tracks, and railings, and specialize in spiral staircases. Our heavy industrial structural rolling and bending company serves various markets in the U.S. and Mexico.



Pat Mooney, Inc. - The Saw Company

Booth 124 Addison, IL **Ph:** 630.543.6222 Toll Free: 800.323.7503

Fax: 630.543.5584 www.patmooneysaws.com

With over a half -century of metal sawing experience. Pat Mooney Inc. - The Saw Company provides a wide range of innovative solutions to meet your strictest cutting requirements.

# PDM Steel Service Centers, Inc.

Booth 937

Stockton, CA **Ph:** 209.943.0555 Toll Free: 800.800.4736

Fax: 209.943.1606

www.pdmsteel.com

PDM Steel Service Centers, Inc. is a heavy-carbon, structural service center with seven locations serving Northern Steel Service Centers California. Nevada. Utah.



Oregon, and Washington and parts of Idaho, Wyoming, and Colorado. Our inventories include a wide range of steel products, including wideflange beams, channels, HSS, pipe, angles, bars, plate, and sheet.

# nascc: the steel conference

Nashville • April 2-5, 2008

www.aisc.org/nascc

# exhibitors

# **Peddinghaus** Corporation

Booth 101 Bradley, IL **Ph:** 815.937.3800

Toll Free: 800.786.2448 Fax: 815.937.4003

# www.peddinghaus.com

Peddinghaus Corporation, established in 1903, is the premier manufacturer of fabrication machine tools for the steel construction and heavy plate fabrication industries. Peddinghaus is the acknowledged global technology leader in providing structural drilling machines, angle and flat (Anglemaster) processing, structural burning systems, automated band saws, and heavy plate processing centers. With more than twenty global patents, Peddinghaus pursues excellence in design, manufacture, and customer service dedicated to the steel construction industry.



#### **Peerless Industrial Equipment Corporation** Booth 632

Oshkosh, WI Ph: 920 231 4100 Toll Free: 800.558.0246 **Fax:** 920.231.4303 www.peerlessusa.com

For over 105 years, Peerless has a proud tradition of producing some of the finest metal-cutting saws in the market. Peerless offers a wide range of saws from small to mammoth to fit your specific application. Peerless also offers a superior array of CNC plate processing machines, along with CNC angle rolls and plate rolls. Peerless is the largest source of DAITO CNC drill lines, structural saws, robotic coping machines, and material handling packages in North America. If your requirement is to cut, bend, roll, or drill metal. Peerless is the answer!

# **Perimeter Protection Products**

Booth 1037 Middlesex, NJ Ph: 732.469.5626 Fax: 732.271.9460

# www.perimeterprotectionproducts.com

Many users of building and construction materials find that the products they select must be practical, economical, or environmentally sustainable. But not all three. The PPP system was designed to provide savings in time, money, and waste. Perimeter Protection Products (PPP) consists of a base plate that is welded to the structural beams of a building, and a reusable post that locks into each plate. The posts support wire cable at the edge of each floor and reduce workers' exposure to falling. At the end of a project, the posts can be easily removed and reused on future buildings. The bases become part of the structure.

# **Pieresearch**

Booth 1036 Arlington, TX **Ph:** 817.265.0980 Toll Free: 800.342.2409 Fax: 817.275.2335 www.pieresearch.com

The sole purpose of our products, Centraligner pier sleds and Hijacker pier bolsters, is to keep a reinforcing steel cage centered and off of the floor of a drilled shaft to insure proper alignment and concrete cover in accordance with the engineer's specification. Our products are made of 8,500-psi, high-strength grout so that they will not break, shatter, or come apart, and are secured to the cage with galvanized integrated tie wires. Because of their function, our products provide quality assurance and are thus potential contingent liability reducers.

# Pneutek, Inc. Booth 1400

Hudson, NH **Ph:** 603.883.1660 Toll Free: 800.431.8665 Fax: 603.882.9165 www.pneutek.com

Pneutek is the established leader in the mechanical attachment of steel roof and floor decking. Traditional methods of attaching steel and roof deck are becoming obsolete. Pneutek's revolutionary

Air/Safe fastening method is changing the steel decking industry across the country. The patented Air/Safe design is completely pneumatic and uses no explosives. It is safer, faster, and more reliable than dangerous power tools or traditional, inconsistent welding methods. Through its innovative tools and fasteners, Pneutek is dramatically improving the quality, safety, and costs of major construction projects across America.

#### **PPG Protective and Marine Coatings** Booth 1331

Pittsburgh, PA Ph: 412 434 0951 **Toll Free:** 800.441.9695

www.ppgpmc.com

PPG's Protective and Marine Coatings (PMC) protect customer assets in some of the world's most demanding conditions and environments. PMC is uniquely positioned with proven products and technologies in PPG Amercoat, PPG High Performance Coatings, PPG Keeler and Long, and other brand families.

# Precision Steel Detailing, LLC

Booth 1403 Bakersfield, CA **Ph:** 661.862.5790 Fax: 661.862.5791 www.psdllc.net

The mission of Precision Steel Detaiing, LLC is to provide on-time, on-budget projects by focusing on project management and offering the best detailers, 3D modelers, and checkers in the industry. Precision Steel Detailing can provide drawings in any specific detailing format and software that fits the fabricator's needs.

# **Prothious Engineering Services** Booth 520

Ventura, CA Ph: 310.890.7284 Fax: 775.796.3404 www.prothious.com

Prothious Engineering Services is one of the largest and most successful detailing companies in the world. Prothious has several hundred engineers, detailers, and estimators, one of the most experienced and well-respected teams in the industry, and an annual detailing capacity of several hundred thousand tons. Our services include industrial duct, post-tension, CMU, masonry, preengineered building, precast, and prestressed detailing. We also

provide services for estimation and connection design.

Booth 1238 Baton Rouge, LA Ph: 225.756.8629



# www.psdetailing.com

Look to PSD. Inc. for your next structural engineered design project. We have engineers in house to help with the project, from conception through completion. We are equipped with a talented staff that will design, layout, coordinate, detail, and engineer the most complex structures, from conception through detailing, connection design, fabrication, and construction. At PSD, our mission is to understand our customer's requirements, provide a product with zero defects, and complete projects on time while adding value every step of the way.

designingfortheFUTURE

# **Quality Management Company, LLC** Booth 740

Chicago, IL Ph: 312.670.7520 Fax: 312.896.9202 www.amconline.com

Quality Management Company provides independent, quality audits for the American Institute of Steel Construction's Certification Program. With expertise in fabrication and/or erection, QMC auditors conduct rigorous examinations that evaluate a company's quality management system (rather than the specific product). This process provides specifying engineers with the assurance that an

AISC Certified fabricator or erector incorporates the proper procedures, personnel, organization, experience, knowledge, equipment, capability, and commitment needed to successfully fabricate or

**QMC** 

# **Quebec Detailing Connection**

Booth 513

Laval, QC Canada

Ph: 450.688.7336 Toll Free: 866.677.6161 Fax: 450.688.3289

#### www.quebecconnection.com

The Quebec Detailing Connection: When time is of the essence, safety, and quality synonymous of flawless erection, where intelligent, no-nonsense detailing is needed. That's when the power of 150 detailers using state-of-the-art Tekla Structures and SDS/2 makes the difference with details done the American way by experienced American detailers caring for your clients.

# **Quincy Joist Company**

Booth 943 Quincy, FL **Ph:** 850.875.1075 Toll Free: 800.277.1075 Fax: 850.875.5826 www.quincyjoist.com

QJC is a leader in manufacturing open-web, steel joists, long spans, and joist girders. We are committed to excellence in customer service, quality products, value engineering, and flexible delivery schedules to meet our customers requirements. These attributes equate to value for our clients and their customers. The combination of our state-of-the-art equipment, coupled with our expert staff—trained and experienced in every aspect of steel joist manufacturing—gives us the competitive edge. Our engineering department is capable of handling all types of projects with a reputation second to none. We have locations in the southern U.S. in order to optimize your shipping dollar. Please call us to find out more about how we could help you with your joist and

# **Radley Corporation** Booth 911

Grand Rapids, MI **Ph:** 616.554.9060

Toll Free: 800.968.8208 Fax: 616.554.9008

# www.radlev.com

Tightly integrated with FabTrol MRP, Radley's Workforce Productivity Solution Suite simplifies data-entry processes, provides real-time progress tracking, and validates shipping to make sure you consistently have the right material, in the right quantity, sent to the right job site, at the right time. Instant access to accurate information gives steel fabricators the competitive edge critical to success in today's markets. For over 30 years, Radley's expertise has assisted industrial manufacturers of all sizes to productively manage their data.

# **RISA Technologies**

Booth 619

Foothill Ranch CA Toll Free: 800.332.7472 Fax: 949.951.5848

# www.risatech.com

RISA Technologies develops and supports innovative structural analysis and design software. Our highly popular applications



enable structural engineers to more efficiently and productively conceptualize and design buildings, stadiums, bridges, tanks, towers, racks, conveyors, and most anything else. Static or dynamic, simple or complex, RISA Technologies has the answer. Please stop by our booth and let us show you what we can do for you!

# **RMM Global, LLC**

Booth 1007 Akron, OH Ph: 330.867.4505 Fax: 330.867.4506

www.rmmglobal.com

RMM Global, LLC is an industry leader in providing structural steel detailing services. With an annual detailing capacity of over 100,000 hours and the utilization of detailing software like SDS/2 and Tekla Structures, RMM is in a position to service all its clients in a timely fashion. RMM Global's experience profile includes project executed in industrial, commercial, health-care, sports, and education facilities all across the U.S.

# exhibitors

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# **Ronstan Cable and Rod Systems**

Booth 1028 Portsmouth, RI **Ph:** 401.293.0539 Fax: 401.293.0538

Toll Free Fax: 866.218.8125

#### www.ronstan.com

Ronstan manufactures cable and tie rod systems for structural architectural applications. Stainless steel and carbon systems up to 5 in diameter for cable and rod systems are available. All systems are pre-engineered and load rated. Innovative tamper-resistant cable rail designs are unique, preventing sagging cables and theft.

# SAFI Quality Software, Inc.

Booth 1108

Sainte Foy, QC Canada

**Ph:** 418.654.9454 Toll Free: 800.810 9454

Fax: 418.653 9475 www.safi.com

SAFI is presenting several structural applications and the new VSB Virtual Steel Building, a seamless BIM integrated technology with no data transfer requirements. VSB covers modeling, steel and connection design, detailing, engineering drawings, estimation, and fabrication. The symbolic steel economy equation VSB=M+E+F+D drives all operations of this virtual BIM model. Let us show you how your next steel projects will look like.

# Saginaw Pipe Company, Inc.

Booth 1214 Saginaw, AL

**Ph:** 205.664.3670 Toll Free: 800.433.1374 Fax: 205.664.3677 www.saginawpipe.com

Saginaw Pipe Company is one of the steel and pipe industry's leading metal service centers. We have a 20-year history rich in growth and accomplishment. To strengthen and continue that tradition, our focus is on our primary asset: our customers. We are a major solution source of steel pipe, steel beams, steel tubing, and plate, offering special-order and cut-to-length services and specialty fabrication back-up. We also have the Southeast's largest inventory of square and rectangular tubing and structural steel beams on a single site.

#### St. Louis Screw & Bolt Booth 727

Madison, IL Ph: 314.389.7500 Toll Free:

800.237.7059 Fax:

314.389.7510

# www.stlouisscrewbolt.com

St. Louis Screw & Bolt is the oldest structural bolt manufacturer in the U.S. We specialize in the manufacture of ASTM A325, A490 structural bolts in types 1 and 3, ASTM A449 Hex Bolts, ASTM F1554 anchor bolts, sag and brace rods, and ASTM A325 and A490 TC bolts. We sell direct to structural steel fabricators and offer complete project support.

# **Schuff Steel Company**

Booth 618

Phoenix, AZ Ph: 602.252.7787 Fax: 602.251.0335 www.schuff.com

Founded as a turnkey steel fabrication and erection company in 1976, Dave and Scott Schuff's vision of being a total steel contractor has become a household name within the steel industry. While wide market growth continued in the design-build/assist market, our in-house detailing, engineering, fabrication, and erection expertise allowed Schuff Steel Company to emerge as the largest steel fabricator and erector in the United States. Let us show you how We Make It Happen on your next project.

# Seismic Structural Design Associates

Booth 620

Los Angeles, CA Ph: 213.494.0446 Fax: 213.741.8620 www.slottedweb.com

Seismic Structural Design Associates hold U.S. and foreign patents for technology created to achieve the lowest stress concentra-

tion factors of any moment frame design, removing the cause of seismically induced failure of the pre-Northridge beam-to-column moment frame connection and nearly all shear from girder flanges. Requires no end bracing, used in deep columns, less field flange welding, and the most economical seismic structural steel moment frame connection available. SlottedWeb, the connection keeping steel construction competitive.

# **Sen Consulting Corporation** Booth 500

Hicksville, NY

Ph: 516.248.9501 Fax: 516.248.9502 www.sen-group.com

We consist of five detailers and a P.E. in N.Y. and ten detailers in Toronto. We do a lot of detailing for contractors and fabricators

around N.Y., N.J., Pa., and Texas. We are involved in structural steel, reinforced concrete, and misc. steel shop drawings. We use Tekla Structures and AutoCAD.

# **Sharon Stairs**

Booth 1119 Akron, OH

Ph: 330.777.5377 Toll Free: 800.792.0129 Fax: 330.777.5351

# www.sharonstair.com

Since 1963, Sharon Stairs has been life saftey's first responder with its pre-engineered drop-In egress stair and railing systems. With the new state-of-the-art manufacturing facility of more than 200,000 sq. ft, Sharon Stairs and its staff will continue to lead in product development, production capacity, and customer service. When it comes to egress keep it simple—Keep it Sharon Stairs.

# **Sherex Fastening Solutions**

Booth 1411 Tonawanda, NY

**Ph:** 716.875.0315 Toll Free: 866.474.3739 Fax: 716.875.0358 www.sherex.com

Sherex Fastening Solutions is a leader in the manufacturing and distribution of blind rivet nuts, brass inserts, blind bolts, and installation tooling. Blind bolts are a revolutionary fastening device used in steel applications where there is no backside access. Sherex provides engineering and technical support for current and new application designs.

# **Sherwin-Williams**

Booth 1033 Cleveland, OH

7ew & 85

Ph: 216.566.2000 Toll Free: 800.524.5979 Fax: 440.826.1989

# www.sherwin-williams.

# com/im

In the shop and the field, Sherwin-Williams' high-performance coating systems for fabricated steel apply and cure quickly, improve your productivity, and provide better long-term value. We have solutions that defend against corrosion and extend

the life of steel surfaces. Count on Sherwin-Williams to help you keep your projects on schedule and corrosion at bay.

# Shop Data Systems, Inc. Booth 1405

Garland, TX **Ph:** 972.494.2719 Fax: 972.272.7062

www.shopdata.com Shop Data Systems (SDS) has been servicing the steel fabrication industry for more than 30 years with CAD/CAM software solutions. The system will import flat plate components directly from your structural design software. System features: imports file-embed-





#### SidePlate Systems, Inc. Booth 1025

Laguna Hills, CA

Ph: 949.305.7889 Toll Free: 800.475.2077

Fax: 949.305.6395

# www.sideplate.com

SidePlate Systems, Inc. provides connection design of, and licensing for, the patented SidePlate Moment Connection for healthcare, educational, instructional, commercial, and government clients. The connection is used to design steel moment frames for lateral force resistance and progressive collapse mitigation.



# SKM Industries, Inc.

Booth 623

Olyphant, PA Ph: 570.383.3062 Toll Free: 800.851.8464 Fax: 570 383 9482

Toll Free Fax: 800.851.6484 w.skmproducts.com

SKM Industries, Inc. has been in business since 1980, manufacturing high-quality industrial paint markers. These markers come in various colors and two different style tips. A squeeze action metal tip and our pump-action, non-slip Pro Rubber Grip Marker. SKM is a women-owned minority business and manufactures all of its own products at our new and modern facility located in Olyphant, Pa.

# **Skyline Steel Fabrication, LLC**

Booth 425 Armorel, AR

**Ph:** 870.762.1000 Toll Free: 866.790.9267 **Fax:** 870.762.1411

www.skylinesteel.com Skyline Steel Fabrication, LLC has over 15 years experience in steel building fabrication and over six years experience in piling fabrication, which includes walers, pipe pockets, and corners made from PZ material. We also fabricate Tees and Wyes from PS material. Our fabrication experience covers suppling material for libraires, airports, casinos, and museums. We are AISC Certified as well as certified with AWS (American Welding Socitey). We have processing capabilities such as splitting beams and channel, heat, and machine cambering, cut-to-length, milling, and drilling. We

# Soft Steel, Inc. **Booth 1401**

Highland, CA Ph: 909.863.9191 Fax: 909 863.9168 www.softsteelinc.com

also store Jumbo Arcelor-Mittal beams.

Soft Steel is offering three products at this year's show. First, Softscan: scans (reads) any bill of material from any DWG or DXF file and outputs files for importing into production management software. Second, Softburn: reads the plates from any CM sheet in DWG or DXF format and creates full-scale DXF or DSTV files for the CNC plate burner. Third, our flagship product, Soft Steel: the fully automated, easy-to-use, AutoCAD-based 3D modeling detailing system.

# **SOFTEK Services Ltd.** Booth 1013

Richmond, BC Canada Ph: 604.273.7737

Fax: 604.273.7731 www.csc-softek.com

Since 1981, SOFTEK Services Ltd. has produced analysis and design software for structural engineers, establishing a solid reputation for quality and ease of use. Using the latest technology, we continue to deliver powerful and cost-effective solutions. Our products S-FRAME, S-STEEL, and S-CONCRETE Version 8.x set new standards for simple to advanced analysis and integrated steel design. Please visit our booth for more information

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# Southern Chapter NISD

Booth 728 Pinson, AL

**Ph:** 205.681.3487, x100 Fax: 205.681.3493

The Southern Chapter NISD consists of these firms: DDuck, Inc. (David Duckworth, 205.680.6500), Drafting Service (Morris T. Crow, 205.655.2168), K. Edward Byrd, P.E. (Ed Byrd, 662.844.9688), Nationwide Detailers, Inc. (Alan Blankenship, 205.681.3487), and Structural Technics (Joel Hicks, 205.956.4501).

# **Southwest Detailers Association**

Booth 1008 Mc Kinney, TX **Ph:** 972.964.3310 Fax: 972.867.2198

The Southwest Detailers Association consists of the following NISD chapter firms: Don Pope & Associates (Don Pope, 817.277.9853), Fabricators Service, Inc. (Harold Bender, 972.669.3331), Glenn Ihde & Co. (Glenn Ihde, 214.619.1576), Hargrave Detailing, Inc. (Reginal Hargrave, 214.637.1104), M.D. Bowers, Inc. (Michael Bowers, 972.226.6433, x103), Roberson's Detailing (David Roberson, 972.231.4939), and Webber-Rookes Detailing, Inc. (Mario Weber-Rookes, 972.578.0001).

# Spencer Reed Group, LLC

Booth 1208 Mission, KS

Ph: 913.671.8880, x3050, 913.327.2906

Fax: 913.671.8898 www.srgonesource.com

SRG originated in 1996 to assist conventional steel fabricators and metal building manufacturers with additional workloads for structural detailing and engineering. Our projects range from 5 to 2,500 tons utilizing SDS/2 software. Our diverse expertise, NISD QPP and IDC certifications, advanced computer technologies, experienced personnel, and client commitment make as a valuable resource to our clients. We are a member of AISC. Please refer to our website for further clarification and examples of our projects.

# **SSDCP**

Booth 720

Charlotte, NC Ph: 704.370.0840 Fax: 704.358.1801 www.ssdcp.com

SSDCP is the most comprehensive AutoCAD add-on you can get. More than 190 automated programs for detailing stairs, rails, beams, columns, embeds, roof frames, anchor bolts, vertical and horizontal bracing, and everything in between! Written by a steel detailer with over 40 years of experience, SSDCP shows you an on-screen picture of what you're detailing, then you enter dimensions that match the picture. It's quick and easy! Use it alone or in tandem with 3D software. See us at Booth 720 in Nashville.

# Star Seismic

Booth 521 Park City, UT **Ph:** 435.940.9222 Fax: 435.655.0073

vww.starseismic.net

With Star Seismic, you could save \$2.40 per sq. ft on your building. That is what a study, presented last year at NASCC, found. Not only do you get a superior seismic performance with the PowerCat and WildCat buckling restrained braces, but you save money with the system. Let the professionals at Star Seismic reduce your risk by assisting you as you step through the use of this superior seismic system on your next project.

# Steel Cast Connections, LLC

Booth 1127 Seattle, WA Ph: 206.250.7035 Fax: 206.622.0015

# www.steelcastconnections.com

The Kaiser Bolted Bracket is the easiest way to provide full special moment connection capacity to a project. It is field bolted with only a shop fillet weld for new construction. The retrofit version is drilled and bolted in place, eliminating welding and special inspections. The cost savings are significant with the unique bolted design. The bracket requires no fees, has been extensively tested, and is currently in process to become an AISC pre-qualified connection.

# Steel Deck Institute

Booth 524

Fox River Grove, IL **Ph:** 847.458.4647 Fax: 847.458.4648 vww.sdi.org

Trade association of manufacturers of steel floor and roof decks and manufacturers of related products used in the production or erection of steel decks. The SDI provides uniform industry standards for the engineering, design, manufacture, and field usage

of steel decks.

# Steel Erectors Association of America

Booth 526

Greensboro, NC **Ph:** 336.294.8880 Fax: 413.208.6936

Founded in 1972, the SEAA is the largest nonprofit trade organization of its kind for steel erectors, bringing members access to the industry's most essential technical information, networking opportunities, and career development tools. The Steel Erectors Association of America provides support and representation



on steel erection issues that serves the global needs of industry, government, and the public. Because of its strong membership, the SEAA is proactive in meeting industry needs and responsive to worldwide steel erection and construction issues

# Steel Founders' Society of America

Booth 1402

Crystal Lake, IL Ph: 815.455.8240 Fax: 815.455.8241 www.sfsa.org

Steel Founders' Society of America (SFSA) is a not-for-profit trade association whose mission is to promote and develop steel castings. SFSA's membership is limited to steel casting producers. We strive to serve by developing new technology, exchanging technical and operating experience, and expanding the steel casting marketplace.

# Steel Joist Institute

Booth 1226

Myrtle Beach, SC Ph: 843.626.1995 Fax: 843.626.5565 www.steeljoist.org

Besides setting standards for the steel joist industry, SJI, a notfor-profit organization, works closely with major building code bodies to develop code regulations regarding steel joists and joist girders. We also invest thousands of dollars in ongoing research related to steel joists and joist girders and offer a complete library of publications and other training and research

# Steel Projects

Booth 108

Vienne

**Ph:** 33.4.74.31.17.30 Fax: 33.4.74.78.04.10 www.steel-projects.fr

Our market-leading Window- based modular CAD/CAM production software has provided tremendous time and cost savings to structural steel constructors for many years.

# **Steel Recycling Institute**

Booth 1140 Pittsburgh, PA Ph: 412.922.2772 Toll Free: 800.876.7274 Fax: 412.922.3213 www.recycle-steel.org

The Steel Recycling Institute (SRI) is an industry association that promotes and sustains the recycling of all steel products. The SRI educates the solid waste industry, government, business, and ultimately the consumer about the benefits of steel's infinite recycling capability

# exhibitors

# **SteelCad Consulting Corporation**

Booth 1129 Parrish, FL

**Toll Free:** 800.456.7875 Toll Free Fax: 800.456.7875

www.steelcad.com

SteelCad offers automated steel detailing and fabrication software. SteelCad complies with AISC and CISC standards and detailing methods. It details beams, columns, vertical and horizontal bracing, stairs, and ladders. It produces erection drawings, gathers sheets, material lists, cut lists, and production control or CNC data.

#### Strand7/Beaufort Analysis, Inc.

Booth 1201 Beaufort, NC **Ph:** 252.504.2282 **Fax:** 252.504.2282

ww.strand7.com

Strand7 is a sensibly priced FEA system for Windows. It is used for civil, structural, and mechanical applications at more than 3,000 sites worldwide. Strand7 comprises preprocessing (including automatic meshing of CAD models), solvers (linear and nonlinear static, dynamic, and heat transfer), postprocessing, and powerful API-benchmarked with detailed verification

# StrucSoft Solutions, Inc.

Booth 1101 Montreal, QC

Canada **Ph:** 514.341.9646

**Toll Free:** 877.810.7575 **Fax:** 514.341.8856

www.strucsoftsolutions.com

StrucSoft Solutions are expert consultants and 3D software solution providers for the structural steel industry. Recognized as the proud partner and North American sales, training, and support center for ProSteel 3D, our company also develops software for specialized markets in the steel industry. These custom applications give our clients a competitive edge on projects of any size. Offshore construction (Jacket Pro 3D), tower construction (Tower Pro 3D), pressure vessel application (PVGEN Pro 3D), and STUD Pro 3D, a unique software solution for cold-formed steel framing or light-gauge steel construction. This unique solution allows for hybrid steel construction, a mix of standard and light-gauge steel. Our services include consulting, training, software development and implementation, support, and complete turnkey solutions for the design-build industry. For further information, please contact our client services dept at 514.341.2028 or email us at info@ strucsoftsolutions.com.

# Structural Bolt & Manufacturing, Inc. Booth 1041

Nashville, TN Ph: 615.255.2540 Toll Free: 800.423.1730 Fax: 615.255.5133 www.structuralbolt.com

Since 1985, our experience, product lines, and service have made Structural Bolt & Manufacturing your one-stop source for anchor rod assemblies, fasteners, and accessories for the structural steel industry. We manufacture anchor bolts to your specifications in all material grades, including ASTM F1554 Grades 36, 55, and 105. We also stock a wide range of A325 and A490 hex bolts and tension-control bolt assemblies, anchors, epoxy and annular cutters.

# Structural Desktop, Inc. Booth 1202

Van Buren, AR Ph: 479.471.5227 Toll Free: 866,269,8394

Fax: 479.471 5225

# www.structuraldesktop.com

Structural Desktop fully integrates the analytical modeling process with AutoCAD. Structures can be rearranged from the analytical model to a realistic representation of the actual structure, and material listings, plans, elevations, sections, starting points for details, and solid models for rendering can be extracted from this model in a few seconds. Reduced costs, improved accuracy, minimum personnel, and minimum miscommunication permit Structural Desktop to pay for itself in a single project. Now at Version 4.0.

# exhibitors

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc

# Structural Engineer magazine - Zweig White **Booth 1412**

Chicago, IL **Ph:** 312.628.5870 Fax: 312.628.5878

www.gostructural.com

Structural Engineer serves as a design and specification resource for practicing structural engineers. Because Structural Engineer is the only magazine published exclusively for structural engineers that is not affiliated with a member-driven organization or association, it serves as an unbiased voice and an agent of change through editorial leadership. Structural Engineer fulfills its mission by including contributed articles covering many aspects of structural design, well-researched news stories, current product applications, and technology innovations into each issue.

# Structural Engineer

# Structural Engineering Institute of ASCE

**Booth 1415** Reston, VA **Ph:** 800.548.2723

www.seinstitute.org

SEI is a vibrant, 21,000-plus community of structural engineers within the American Society of Civil Engineers that strives to serve the unique needs of the structural engineering community-both technical and professional needs. Members of SEI can take advantage of discipline-specific products, services, and activities while also receiving all of the benefits of ASCE membership.

# **Structural Stability Research Council Booth 1413**

Rolla, MO **Ph:** 573.341.6610 Fax: 573.341.4476 stabilitycouncil.org

The council provides support and technical counsel for stability research, holds regular meetings to report on research activities, and publishes the definitive work Guide to Stability Design Criteria for Metal Structures. The SSRC Annual Stability Conference provides up-to-date information and identifies where efficiencies exist in present understanding of structural behavior. Conference proceedings represent a primary source of highlights of the latest solutions to structural problems before they are eventually published in technical journals.

# Stud Welding Associates/Pro Weld

Booth 528 Strongsville, OH **Ph:** 440.783.3160 **Toll Free:** 800 874 7860 **Fax:** 440 783 3178 www.studwelding.com

Stud Welding Associates/Pro Weld offers a full line of shear connectors, headed anchors, deformed bar anchors, weld studs, stud welding equipment, and accessoires. On display is the Arc 3000 stud welder. With a 1-in.-diameter capacity, this easy-to-use and reliable unit is suitable for all construction applications

# Sumter Coatings, Inc.

Booth 725 Sumter, SC Ph: 803.481.3400 **Toll Free:** 888.471.3400 **Fax:** 803.481.3776

www.sumtercoatings.com

Sumter Coatings' systems for the structural steel industry come from many years of experience in product development and service to steel fabricators. Sumter Coatings' products have been designed for ease of application and excellent protection, and to be environmentally compliant. Sumter Coatings' products are designed to meet VOC and HAPS-TAPS compliant standards.

# TAUC (The Association of Union Constructors) **Booth 1418**

Arlington, VA **Ph:** 703.524.3336 Fax: 703.524.3364

TAUC is an advocate for advancing and enhancing the value of the union construction industry through an educated and action-driven membership that fosters the promotion of labor-management cooperation, workplace safety and health, and the collaboration with construction users in order to help union contractors compete more effectively

# Taylor Devices, Inc. Booth 1128

North Tonawanda, NY **Ph:** 716.694.0800 Fax: 716.695.6015

www.taylordevices.com

Taylor Devices is the world-leading manufacturer of fluid viscous dampers, lock-up devices, shock transmission units, shock absorbers, cable dampers, and custom tuned mass damping systems. These devices and systems can be used to protect building and bridge structures from the devastating vibrations caused by earthquakes, wind, hurricanes, and other vibrational disturbances

# **TDS Industrial Services Ltd.** Booth 722

Prince George, BC Canada Ph: 250.561.1646

Fax: 250.562.8549

www.tdsindustrial.com Steel Detailers of structural and miscellaneous steel, as well as plate work, since 1979. If you can build it, then we can detail it using StruCad, Tekla Structures, or AutoCAD

#### Techflow, Inc. Booth 507

Duluth GA Ph: 770.495.1446 Toll Free: 888.496.1446 Fax: 770.495.1448

ww.techflowengg.com

Techflow, Inc., a new venture of Techflow Engineers (I) Pvt. Ltd., has emerged to serve better service to our existing clients and to expand service area in the U.S. and Canada. We are the service provider for automated structural steel detailing and designing to civil engineering projects in the public and private sector worldwide. At present we are an organized and motivated team of 200 personnel. Our professionals are qualified, experienced, and very conversant with AISC, BIS, IS, and OSHA standards, having a production capacity of 38,200 tons per month

# Tekla, Inc. Booth 713 Kennesaw, GA

**Ph:** 770.426.5105 **Toll Free:** 877.835.5265 Fax: 770.919.0574 www.tekla.com

Tekla Structures provides fabricators and steel detailing offices an effective solution to manage project information. The same intelligent 3D model pulls all the information so everyone on the project can collaborate in real time. Tekla Structures includes an extensive range of tools to automate the detailing process.



# Tennessee Galvanizing, Inc.

Booth 1034 Jasper, TN **Ph:** 423.942.1020 Toll Free: 877.242.5848 Fax: 423.942.1040

# www.tennesseegalvanizing.com

We are a leading provider for high-quality corrosion protection. We offer same-day service. With four kettles, we can work with any lead time customers need. We ship and receive a minimum of 18 hours a day. ISO 9001:2000 Quality Control and ISO 14001 Environmental Certified. TN Galvanizing uses only special, high-grade zinc.

# TradiantCAD.com

Booth 1325 Memphis, TN Ph: 901.881.1250 Fax: 360.851.5129 www.tradiantcad.com

TradiantCAD.com is an emerging leader in the steel detailing industry, helping clients successfully complete major construction and engineering projects in the U.S and all over the world. TradiantCAD.com's state-of-the-art technology, combined with its ability to efficiently and consistently deliver on client's specific ordering, fabrication, and erection needs, has made TradiantCAD.com the

industry's Steel Detailing Outsourcing Partner of Choice. Tradiant-CAD.com is committed to providing the highest quality, lowest cost, fastest turnaround, and most dedicated customer service in the steel detailing industry. For your next steel detailing project, please consider TradiantCAD.com.

# TRC Worldwide Engineering, Inc.

Booth 1124 Brentwood, TN Ph: 615.661.7979 Toll Free: 888.650.7979 Fax: 615 661 0644 www.trcww.com

TRC Worldwide Engineering, Inc. was founded in 1989 as a structural engineering company and has grown into a Top-500 design firm, as rated by ENR. Services include state-of-the-art steel detailing (NISD member) and design/build construction administration. We utilize SDS/2, and all detailing and D/B projects are 100% managed and checked from our offices in Brentwood, Tenn. With enormous multi-project capacity, our recent successes include detailing over 3,200 tons of structural steel for Nissan North America headquarters in Franklin, Tenn.

# TurnaSure, LLC Booth 729

Langhorne, PA Ph: 215 750 1300 **Toll Free:** 800 525.7193 **Fax:** 215 750.6300

# www.turnasure.com

TurnaSure's legacy company invented direct tension indicators (DTIs) nearly half a century ago. Recently, TurnaSure radically redesigned DTIs and expanded



the product line. For structural bolts, they are covered under ASTM standard F959; a new ASTM F2437 covers anchor bolts. TurnaSure is the world's largest manufacturer. Their ingenious patented curved protrusion design enables DTIs to be inserted directly under the nut eliminating the cost or need of a hardened washer for greater convenience for properly tensioning bolts.

# Unipunch Products, Inc.

Booth 423 Clear Lake, WI Ph: 716.825.7960 Toll Free: 800.828.7061 Fax: 716.608.2119 Toll Free Fax: 800.453.3994

# www.unipunch.com

Unipunch Products manufacturers modular press tooling know as C-frame or Unitized tooling. This tooling system is designed for punching holes in sheet metal, aluminum extrusions, structural steel, brake or roll formed parts, and tube and pipe. Material capabilities range from 24 gauge up to 34 in. mild steel. Notching units, shearing units, and custom tooling based on specific customer applications are also available. Full engineering and design services provided.

# **United Rentals** Booth 1324

Toll Free: 800.UR.RENTS www.unitedrentals.com

United Rentals is your one-stop source for equipment rentals, sales, service and supplies. We have what it takes to complete your jobs faster, smarter, better. We offer the most popular names in the industry so you know you will be getting a trustworthy, reliable brand. And with more than 14,000 employees and 2,500 sales specialists, we have the resources and expertise to service you, from selection to delivery. Let us help you meet your challenges head on. Stop by one of our 740+ branches or visit our web site.

# **V&S Galvanizing**

Booth 1019 Columbus, OH Ph: 614.449.8281 Fax: 614.449.8851

# www.hotdipgalvanizing.com

V&S Galvanizing is a leader in the hot-dip galvanizing industry, with many locations on the East Coast and Midwest, and mroe than 70 locations worldwide. Specializing in corrosion protection of steel with zinc by hot-dip galvanizing We offer the DUROZINQ program of galvanizing, packaging, tagging, and guaranteed service. We also offer our COLORZINQ system (paint over galvanizing) that adds brilliant color to a base of corrosion protection. V&S offers trucking and many other value-added services.

# nascc: the steel conference

Nashville • April 2-5, 2008 www.aisc.org/nascc



# Valley Supplies, Inc. Booth 1406

Irvington, NJ **Ph:** 973.854.8623 Fax: 973.854.8652

www.valleysupplies.com

Wholesale supplier for all wide-format reprographic imaging supplies, such as wide-format paper rolls and sheet, toner, and supplies for all Oce, KIP, Xerox, and other wide-format machines. With a 50,000-sq.-ft warehouse in northern N.J., almost everything is in stock and ships the same day.

# **Voortman Corporation**

Booth 228 Manteno, IL **Ph:** 815.468.6300 Fax: 815.468.6333 www.voortmancorp.com

Voortman Corporation is the fastest growing manufacturer of CNC structural fabricating systems such as saws, drills, angle lines, flat bar and angle processing lines, coping systems, plate processing systems, shot-blasting systems, tube cutting systems, and fully automated material-handling systems for unmanned operation in North America today. Voortman not only manufactures this equipment but also has a fully automated fabrication shop producing 22.000 tons per year.

# Voss Engineering, Inc.

Booth 1311

Lincolnwood, IL **Ph:** 847.673.8900 **Toll Free:** 800.323.3935 **Fax:** 847.673.1408

# www.vossengineering.com

Voss Engineering, Inc. provides expansion/slide bearing assemblies, bearing pads, and isolation materials for highway bridges, industrial structures, machines, process piping, and commercial buildings. Our product line includes the following structural bearing pad materials: SORBTEX (preformed fabric pad/cotton duck pad), NEOSORB (AASHTO grade polychloroprene), VSB Slide Bearings (PTFE and steel plate), and FIBERLAST or VOSSCO (random oriented fiber pads).

# Wheelabrator Group

Booth 738 LaGrange, GA **Ph:** 706.884.6884 **Toll Free:** 800.544.4144 **Fax:** 706.884.9940

# www.wheelabratorgroup.com

Wheelabrator Group manufactures a full range of wheel-type shot-blast machines, mass-finishing equipment dedicated to the demands of the industry, and automated airblast solutions. Technically advanced and designed for ease of maintenance, Wheelabrator Group machines range from standard versions to fully customized and integrated systems. Wheelabrator Plus professionals will assess your current blasting equipment to determine if any productivity, cost savings, safety, or environmental improvements could be realized as a result of upgrading to newer technology.

# Wheeling Corrugating Company

Booth 824 Wheeling, WV

Toll Free: 800.922.3325 **Fax:** 304.234.2330

# www.wheelingcorrugating.com

Wheeling Corrugating Company, a division of Wheeling - Pittsburgh Steel Corporation, is one of America's leading fabricators of steel decking for the construction, highway, and bridge building markets. We have the distinction of being our nation's most experienced decking manufacturer, with over 117 years of metal forming history. We have grown to 14 facilities nationally, which are strategically located throughout the country. See our new steel deck attachment process, the Seismic ShearLoc System, at our booth!

# World Engineering Services Pvt. Ltd.

Booth 1300

Andheri (East), Mumbai, India **Ph:** 91.22.6696.0415 Fax: 91.22.6696.0418

www.worldengg.com

WESPL is an engineering services company located in Mumbai, the finanacial capital of India, and was founded four years ago. Among the various services the company provides, steel detailing is its forte. WESPL provides this service using StruCad and AutoCAD, and has placed an order for multiple licences of SDS/2.

# **Exhibitors**

# arranged by booth number

Peddinghaus Corporation Ficep Corporation 101 108 108 119 124 224

Steel Projects
Ocean Machinery
Pat Mooney, Inc. - The Saw Company
DAITO U.S.A., Inc.

228 Voortman Corporation
Controlled Automation, Inc.

401 Infra-Metals Company 405

Allied Machine & Engineering Corporation American Punch Company 407

413 419 COMEQ, Inc. Cleveland Punch & Die Company 423 425 Unipunch Products, Inc. Skyline Steel Fabrication, LLC

427 429 LS Industries CAMBCO, Inc. Behringer Saws, Inc.
Burlington Automation
Sen Consulting Corporation 433 500

Hougen Manufacturing, Inc. Marubeni-Itochu Steel America, Inc. (MISA) 502

503 504 Cast ConneX Corporation Combilift USA

505 507

Combilift USA
Birmingham Fastener, Inc.
Techflow, Inc.
Fabreeka International, Inc.
Quebec Detailing Connection
Nitto Kohki U.S.A., Inc.
Chatham Steel Corporation
Prothious Engineering Services
Star Saignic 508 513 518 519

520 521 523 Star Seismic Faccin USA, Inc. 524 526 527 528

Faccin USA, Inc.
Steel Deck Institute
Steel Erectors Association of America
Algoma Steel, Inc. - Welded Shapes Division
Stud Welding Associates/Pro Weld
MG Systems & Welding, Inc.

541 600

CSC, Ínc. Design Data 601

Delfa Structural Steel Services Group
InfoSight Corporation

604 606 608 Metals USA 609 Lincoln Structural Solutions

Lincoin Structural Solutions
Schuff Steel Company
RISA Technologies
Seismic Structural Design Associates
Moldtek Technologies Ltd.
SKM Industries, Inc. 618 619

622 623

625 626 Genesis Quality Systems, Inc. IMPACT

Atlas Tube, Inc.
Paramount Roll & Forming, Inc. 627 628

Groupe CADmax
Peerless Industrial Equipment Corporation 629 632

641 701 707 708 713 718 719

Kubes Steel, Inc.
Bentley Systems, Inc. - RAM/STAAD Solution Center
Commercial Metals Company (CMC)

Omnitech Associates

Tekla, Inc.
ArcelorMittal International
Dowco Consultants Ltd. 720 722 SSDCP TDS Industrial Services Ltd.

Haydon Bolts, Inc.
Sumter Coatings, Inc.
National Institute of Steel Detailing 724 725

726 727

St. Louis Screw & Bolt Southern Chapter NISD 728 729 733 738 739 739 740 TurnaSure, LLC Corus International Americas

Wheelabrator Group AISC Certification

801

AISC Certification
American Institute of Steel Construction (AISC)
Quality Management Company, LLC
Nucor - Corporation
Nucor - Vulcraft Group
Nucor - Yamato Steel Company
Nucor Fastener Division
Fab Triol Systems, Inc. 801 801 801

809 815 819 BD Structural Design Canam Steel Corporation

Wheeling Corrugating Company
Detailed Design Drafting Services Ltd.
BDS Steel Detailers (USA), Inc.
Chicago Metal Rolled Products
Girder-Slab Technologies, LLC 824 827 828

832 833 901 907 908

AceCad Software, Inc.
ESAB Welding and Cutting Products
Intsel Steel/R&S Steel/Alta-Steelco
Nelson Stud Welding, Inc.

911 913 Radley Corporation Cerbaco Ltd.

J. B. Long, Inc. Computers & Structures, Inc.

Bug-O Systems/Cypress Welding Equipment Lincoln Electric Cleveland City Forge

926 929

Gerdau Ameristeel
Albina Pipe Bending Company, Inc.
PDM Steel Service Centers, Inc.
Aztec Galvanizing Services
Kottler Metal Products, Inc.
Quincu leich Company 932 935 937 939

941 943 1001

Guincy Joist Company
Graitec, Inc.
Gaule Detailing
RMM Global, LLC
Southwest Detailers Association
ISD - International Steel Detailing 1006 1007 1008

1010 1010 1013 Lohr Structural Fasteners, Inc. SOFTEK Services Ltd.

1015

1025

SOFTEK Services Ltd.
Applied Bolting Technology, Inc.
V&S Galvanizing
Creative Engineering Services
SidePlate Systems, Inc.
Lindapter North America, Inc.
Ronstan Cable and Rod Systems
Brown Consulting Services Ltd.
Shookin-Williams 1028 1029

1033 Sherwin-Williams Tennessee Galvanizing, Inc. 1034

Pieresearch Perimeter Protection Products 1036 1037

1038 National Steel Bridge Alliand Allied Tube 1039

1040 Modern Steel Construction magazine Structural Bolt & Manufacturing, Inc. StrucSoft Solutions, Inc. 1041

1101 1103 1107 AAA Galvanizing

SAFI Quality Software, Inc. FabSuite, LLC 1108 1112

1113 P2 Programs Sharon Stairs

TRC Worldwide Engineering, Inc. Hodell-Natco Industries, Inc. High Steel Structures, Inc. 1125 1126

Steel Cast Connections, LLC Taylor Devices, Inc. SteelCad Consulting Corporation Holtec Consulting Private Ltd. 1129 1136

Holtec Consulting Private Ltd.
K Detailing, Inc.
Kee Safety, Inc.
Steel Recycling Institute
LeJeune Bolt Company
Strand7/Beaufort Analysis, Inc.
Structural Desktop, Inc.
International Paint, LLC 1138 1139 1140 1200

1202 1206 1207

North American Galvanizing Company Spencer Reed Group, LLC New Millennium Building Systems Saginaw Pipe Company, Inc. Metal Dek Group, a unit of CSi 1208 1212 1214

1219 Atema LTC, Inc 1224 1225

Steel Joist Institute
Jobber Instruments Calculator Company 1226 1227 1228 DetailCAD

1229 Buckner Companies Industrial Galvanizers America PSD, Inc.

1235 1238 KIP America Madden Bolt & Galvanizing 1239 1240

1300 Indiana Gratings Pvt. Ltd. 1300 World Engineering Services Pvt. Ltd.

1303

Grating Fasteners, Inc. Fisher & Ludlow Grating Products 1305 1307 1311 International Design Services Voss Engineering, Inc.

G.W.Y., Inc Mi-Jack Products 1313 1319 1321 CoreBrace, LLC United Rentals 1324 TradiantCAD.com

1327

1328

American Subcontractors Association, Inc. Carboline Company Hare Information Technolgy Solutions Pvt. Ltd. PPG Protective and Marine Coatings 1329 1331

Eastern Pneumatics & Hydraulics/McCann Equipment Pneutek, Inc. 1334 1400

1401 1402

Soft Steel, Inc.
Steel Founders' Society of America
Precision Steel Detailing, LLC
Shop Data Systems, Inc.
Valley Supplies, Inc.
Elliott/AmQuip (The Crane People)
Association for Iron & Steel Technology 1403 1405

1407 1409

1410 1411

Association from a Steer rectinology Identity Links
Sherex Fastening Solutions
Structural Engineer magazine - Zweig White
Structural Stability Research Council
American Galvanizers Association 1412 1413

1414 1415

(Exhibitors current as of January 25, 2008.)

Article of ASCE
Morgan U-Clamps, LLC
TAUC (The Association of Union Constructors)
American Welding Society



# Coming to a Location Near You!

# AISC Seminars Will Enhance Your Professional Development

Designed to help working professionals enhance their skills in a productive training environment, the American Institute of Steel Construction (AISC) is dedicated to providing you with focused seminars on relevant, timely topics designed to meet your continuing

Attend an AISC seminar and discover how to get the most value from your professional development dollars and earn credits from courses taught by leading industry experts.



# **NEW!** Listen to Steel: Duane Miller on Welding

Everything you need to know about structural welding applications is discussed in this new one day seminar. Each module gives concise resolutions to steel welding issues and together they represent the full spectrum of welding concerns.

# **NEW!** Intelligent Design: Low-Rise and Mid-Rise Buildings

This new seminar focuses on rational and efficient building design methodologies that you can incorporate into your practice as soon as you get back to the office. The lectures cover the philosophy of design, design considerations relative to loads, selection of training systems and their components, preliminary design techniques and much, much more. Don't miss this opportunity to obtain valuable information relevant to design efficiency!



# **Façade Attachments to Steel Frames**

Perhaps the most complicated details in a building occur where the facade and structural frame meet. The details of this interface have a significant impact on the cost of the project. The performance issues that affect the façade attachment details include: proper support of the façade elements, structural anchorage to the frame, relative movements, fire protection, waterproofing, thermal and moisture migration, air infiltration, and sound transmission. Just as these details need to integrate performance issues, the design team needs to coordinate responsibilities between the architect, base building engineer, facade engineer, general contractor, steel fabricator, steel erector, and façade subcontractors.



# **AISC Seismic Provisions/Manual**

AISC Seismic Design - Updates and Resources for the 21st Century

Structural engineers across the country have appealed to AISC for good resources and continuing education seminars on seismic design. In response, Thomas Sabol, Ph.D. – referencing AISC's extensive seismic design resources – has developed a seminar to meet those needs. If you are a practicing structural engineer looking to increase your knowledge of seismic design of structural steel make sure you attend this seminar!



# **AISC Specification/Manual**

Design Steel Your Way with the 2005 AISC Specification

# Don't miss it!

Whether you design in ASD or LRFD, this seminar will accelerate your ability to design steel buildings according to the 2005 Specification for Structural Steel Buildings. The 13th Edition AISC Steel Construction Manual will provide valuable insight into the 2005 AISC specification, which unifies ASD and LRFD and includes the specifications for single angles and hollow structural sections.



Register online at www.aisc.org/2008seminars

Visit www.aisc.org/seminars for more information.

# AISC Spring 2008 **Seminar Schedule**

# **Facade Attachments Seminar**

□ 2/6	Charlotte, NC
□ 2/7	Dallas, TX
□ 3/5	Oklahoma City, OK
□ 3/6	Atlanta, GA
□ 3/11	Cincinnati, OH
□ 3/12	Miami, FL
□ 4/22	San Francisco, CA
□ 4/23	Seattle, WA
□ 5/ <mark>20</mark>	Detroit, MI
□ 5/21	Chicago, IL

# **Specification/Manual Seminar**

□ 3/4	Pasadena, CA
□ 3/6	Sacramento, CA

# Seismic Provisions/ **Manual Seminar**

□ 2/5	Springfield, IL
□ 2/7	Batavia, NY
□ 2/26	Greensboro, NC
□ 2/28	Dallas, TX
□ 3/18	Columbus, OH
□ 3/19	Washington DC

# NEW Listen to the Steel -**Welding Seminar**

□ 4/15	Houston, TX
□ 4/17	Denver, CO
□ 5/6	Portland, OR
□ 5/8	San Francisco, CA
□ 6/3	Bozeman, MT
□ 8/7	Anchorage, AK

# nar

<b>NEW Buil</b>	ding Design Semi
□ 4/15	Kansas City, KS
□ 4/16	New York City, NY
□ 4/17	Harrisburg, PA
□ 4/17	Memphis, TN
□ 4/29	Houston, TX
□ 5/1	Atlanta, GA
□ 5/6	Richmond, VA
□ 5/6	Milwaukee, WI
□ 5/8	Des Moines, IA
□ 5/8	Charlotte, NC
□ 5/14	Providence, RI
□ 5/15	Portland, ME
□ 5/20	San Jose, CA
□ 5/20	Tampa, FL
□ 5/22	Phoenix, AZ
□ 5/22	Baltimore, MD
□ 5/29	St. Louis, MO
□ 6/3	Omaha, NE

Hartford, CT

☐ 6/10 Manchester, NH www.aisc.org/seminars

□ 6/5

# marketplace

# **ACHIEVE AISC CERTIFICATION** WITH ATEMA

We are the best choice to achieve certification for AISC fabricator and erector criteria.

- Save your time to do your business while we address documentation requirements.
- Don't lose contracts that require certification.
- Improve business efficiency.

NASCC: The Steel Conference - Nashville Convention Center - April 2-4 2008 - Booth # 1224

Catch our workshop at NASCC:

"Best Practices that Save Fabricators Money"

Call: 312-861-3000 information@atemainc.com www.atemainc.com



MEMBER

# Structural Steel Detailers • www.gihde.com



QPP Firm • Competitive Rates • Professional Engineer & NISD Cert. Detailers . Quick Turnarounds • Equipment Control Data • All Sizes & Types of Project Fabrication • Electronic Draw-SLENN IHDE & COMPANY ing File Transfers • Staffing to Meet **Project Requirements** 

972,964,3310

Have TEKLA Detailing Software experience? We want you! Contact: glenn@gihde.com

# Are you thinking of becoming AISC Certified?

# **Quality Management Company can help!**

Writing your own Quality Manual may be easier than you think. QMC Online (www.gmconline.com) has a multitude of free resources that can save you time and money preparing your documentation required for AISC Certification. At QMC Online, you'll find:

- A downloadable sample quality manual geared to both large and small fabricators, that includes instructive comments from QMC
- Sample procedures with guidance on how to write them effec-
- Required references that meet current codes and standards for your library
- Answers to over 100 frequently asked questions
- Samples of internal audits and more

Make QMC Online your first stop when considering AISC Certification. or call 312.670.7520.



# 100 TEKLA Structure Licenses WITH TECHFLOW

Applying 3D Technology For Detailing 24x7



Phone: 770.495.1446 Fax: 770.495.1448 email: techflowus@techflowengg.com

Website: www.techflowengg.com

# AISC Quality Certification

Want to get more business and profit in 2008? **Get Certified!** 

# JAMES M. MOONEY & ASSOCIATES



Call 941-223-4332 or 941-485-7172 immoon94@aol.com

Our hands-on experience... Our on-site guidance and training...

# **Quebec Detailing Connection** DO Detailers available Stations of 3D modelers for:

Superior management from "Old School" veterans, combined with the latest technology for simple to complex projects, with tight delivery schedules.

Contact Robert Beauchamp at 1-866-677-6161

email@datadraft.com

Web Site: www.quebecconnection.com

# **Curves Ahead?** We specialize in Rolling!

- Structural Profiles Architectural Shapes

# MARKS METAL TECHNOLOGY

10300 SE Jennifer Clackamas, OR 97015 Info@MarksMetal.com 800.526.1031 www.marksmetal.com

We Bring Metal To Life

# WANTED **Steel Erection Companies**

GOAL-ORIENTED AND PROACTIVE STRUC-TURAL STEEL ERECTION COMPANIES COMMIT-TED TO QUALITY WANTED FOR AISC QUALITY **CERTIFICATION PROGRAM.** AISC is looking for capable erectors interested in getting on bid lists, increasing client confidence, and setting themselves apart from their competition. With over 100 participants and counting, find out why erectors all over the country are becoming AISC Certified. Contact AISC at 312.670.7520 or certinfo@aisc.org today.

# employment

# ESTIMATOR. PROJECT MANAGER

Adams & Smith, Inc., a General Contractor specializing in steel erection and located in Lindon, Utah is looking for an estimator with fabrication and detailing experience. We are also seeking Project Managers. Degree and/or experience preferred.

> Send resumes to: Adams & Smith, Inc. Attn: Tracie Greco 1380 W. Center St. Lindon, UT 84042

# RECRUITER IN STRUCTURAL/MISCELLANEOUS STEEL FABRICATION

ProCounsel, a member of AISC, can market your skills and achievements (without identifying you) to any city or state in the United States. We communicate with over 3.000 steel fabricators nationwide. The employer pays the employment fee and the



interviewing and relocation expenses. If you've been thinking of making a change, now is the time to do it. Our target, for you, is the right job, in the right location, at the right money.

# **PROCOUNSEL**

Toll free: 866-289-7833 or 214-741-2014 Fax: 214-741-3019 mailbox@procounsel.net

# Structural & Misc. Steel Fabrication

Our organization has been recruiting for the Structural and Misc. Steel Fabricating industry for over 20 years. Current positions include:

- Project Manager
- Plant Superintendents Estimators
- General Manager
- Quality Control

· Chief Draftsman

- Detailers
- Checkers

Please send resume to: **Richard Stauffer** 

United Employment Associates, P.O. Box 8, East Texas, PA 18046 phone: (610) 437-5040 fax: (610) 437-9650

e-mail: rstauffer@unitedemployment.com www.unitedemployment.com

# ESTIMATOR/PROJECT MANAGER

Ahlborn Structural Steel, Inc., a structural and miscellaneous steel fabricator and erector, is seeking an Estimator/Project Manager at our Santa Rosa, CA location. 5 years experience in the steel industry and commitment required.

The ideal candidate must be:

- self-motivated
- independent
- highly organized
- · excellent communication skills
- strong attention to detail
- Fabrtrol experience a plus



Ahlborn Structural Steel is a driven organization that has had rapid growth while always insuring a solid foundation. 65K to 75K salary DOE, 3% commission on margin to equal approx. additional 30K annual-minimum per company standard. Company vehicle, excellent benefits, 401K. Moving allowances and signing bonuses are extended in certain circumstances

> Ahlborn Structural Steel, Inc. 1230 Century Ct. Santa Rosa, CA 95403 Attn: Lance Ballenger 707-573-0788 (fax) Lance@ahlborncompanies.com



Ramar Steel, a member of AISC, is one of western New York State's most reputable structural steel fabricators and erectors. Ramar is located in Rochester—on the shores of Lake Ontario and within the Finger Lakes region of the state. We are seeking experienced, talented and motivated steel industry professionals to support our plant expansion and sales growth. We are currently seeking:

- **Detailer** minimum 2-3 years structural steel detailing experience (Tekla / XSteel
- Project Managers to manage multiple fabrication and erection projects
- Fabrication Manager Hands-on professional to oversee shop operation of 15-20 employees
- Estimators Minimum 5 years structural steel estimating experience required

Ramar Steel offers excellent pay, generous medical, dental and life insurance benefits, 401K, profit sharing and bonuses.

Send resumes to mar@ramarsteel.com or fax to 585.263.2734

# **AISC Engineering & Research Dept.** Staff Engineer

If you are looking for an entry-level position, have good people skills, and like new challenges, AISC has an opportunity available. AISC is now seeking applicants for a Staff Engineer position in the AISC Engineering & Research Dept. This is a unique opportunity to work with issues in structural research as well as steel fabrication. You will work with the top educators in the North American steel design and construction industry and will be in a position to establish yourself as an expert in steel design. The position will allow you to use your technical training to develop and promote research and industry issues that benefit the entire structural engineering community and structural steel industry.

Applicants should have a BS degree, with a structural emphasis, in architectural or civil engineering, and must be qualified to work in the U.S. AISC provides a great working environment offering professional development opportunities and a competitive salary and benefits package.

Send resumes to C. Becker at **becker@aisc.org**.

# **LOOKING FOR A NEW START IN 2008?**

# Are you a structural engineer looking for a different path?

We specialize in matching great structural engineers with unique opportunities that utilize their talents, help them achieve their goals, and have a lot more FUN!

# Why have SE Solutions help you find a unique opportunity?

- We have over 25 years of experience working with structural engineers.
- We have relationships with people responsible for hiring decisions with engineering companies all over the United States.
- We will save you time and provide additional information and help during the process of finding a new job that you couldn't find anywhere else.

Call us TODAY to learn more about how we can help you!

# SE Solutions. LLC

Main Office Brian Quinn, P.E. (616) 546-9420

West Coast Office Lisa Willard, EIT (805) 482-8436

www.FindYourEngineer.com



# Project Manager/Detailers/Checkers

SteelStar Corporation is an aggressively growing detailer/fabricator/erector (16-20 Million/Annually) in the Denver Metro area along the beautiful Front Range of Colorado.

Project Manager (\$65-95K Annually)

We are currently seeking an aggressive and skilled project manager with experience in low to mid rise commercial/industrial, miscellaneous and architectural/ornamental metals projects from 500-2000 Tons.

The successful candidate must have a minimum of five years experience in construction project management. Requirements to include, but are not limited to; excellent computer/technical skills, organizational skills, scheduling skills and documentation skills as well as great communication and customer service skills. Most important of all, the successful candidate must have a great attitude! An Associates or Bachelors degree is required; this may be waived in lieu of experience. Relocation to Colorado Required. Must have excellent references and project track record.

# Detailers/Checkers (\$15-\$35 Per/Hour)

We are currently seeking (3) skilled Tekla (Xsteel) and (4) AutoCAD/AutoSD detailers & checkers with experience in low to mid rise commercial/industrial, miscellaneous and architectural/ornamental metals projects up to 2000 Tons.

The successful candidate must have a minimum of (3) year's structural and/ or miscellaneous steel detailing experience. Requirements include, but are not limited to; excellent computer/technical skills and Tekla or AutoCAD experience. Most important of all, the successful candidate must have a great attitude! Relocation to Colorado Required. Candidate must be able to provide excellent references and drawing examples. All candidates must be currently eligible to work in the United States.

We offer the security of a financially stable company, profit sharing, competitive wages, relocation reimbursement, medical benefits, 401K, paid holidays and paid leave time, and most of all, a fun place to work with opportunity for advancement. Please send resume to: SteelStar Corporation, P.O. Box 218 - Dacono, CO 80514 Attn: Employment - Fax 303.828.4092 or email employment@steelstar.com. Visit us @ www.steelstar.com.

# AMERICAN IRONWORKS MFG., INC.

American Ironworks Mfg., Inc. is a structural and miscellaneous steel fabrication and erection company based in the City of Los Angeles, CA. It provides competitive salary package, paid annual vacation leave, health benefits, 401K profit-sharing plan to its employees. Currently, we are seeking high-caliber candidates for the following positions:

**PROJECT MANAGERS.** Minimum 5 years experience in project management, particularly in structural and ornamental metal fabrication and erection. Excellent skills in computer, organizing, scheduling, documentation, communication and customer care.

**FABRICATION MANAGERS.** Minimum 5 years experience in Structural Steel and miscellaneous metal fabrication. Manage shop of 20-25 employees. Must be a hands-on professional, able to work under pressure and with outstanding track record in meeting schedules and deadlines.

**ESTIMATORS.** Minimum 5 years structural or miscellaneous steel estimating experience. Possesses excellent computer skills, able to work under pressure, good in meeting schedules and deadlines.

**DETAILERS.** Minimum 3 years structural or miscellaneous steel detailing experience. Possesses excellent computer skills and preferably proficient in AutoCAD operation. Should be able to work under pressure and meet deadlines.

**QUALITY CONTROL.** Minimum 5 years quality control experience in fabrication and erection of structural steel and miscellaneous items. Detailed, analytical, computer literate and good in reporting and in meeting schedules and deadlines.

Interested candidates should fax their resumes to 818.834.6022.

#### **CIVES STEEL COMPANY**

With an annual capacity in excess of 1,000,000 shop hours and 100,000 tons of fabricated steel, Cives Steel Company is the largest Employee Owned structural steel fabricator in the United States. During our 50 plus years in business we have supplied our product world wide and are a recognized leader in complex structures such as Turner Field in Atlanta, GA to the Hearst Tower in New York City.

If you have a desire to be a part of one of the best Employee Owned businesses in the country and work on some of the most complex structures being built today, then come and be a part of our family.

Cives Steel Company consist of the following business units:

Northern Division, Gouverneur, New York ◆ New England Division, Augusta, Maine ◆ Mid Atlantic Division, Winchester, Virginia ◆ Mid South Division, Rosedale, Mississippi ◆ Southern Division, Thomasville, Georgia ◆ Mid West Division, Wolcott, Indiana

We currently have the following openings:

- Project ManagerDivisional Sales ManagerEstimating Manager

Cives Steel Company is an Equal Opportunity Employer.

Please send resume with cover letter to:

Charles Hentzell Human Resources Manager chentzell@cives.com

# Structural Engineers

Are you tired of being treated like a commodity in the market place? Would you prefer to work directly for the client rather than the Architect? Are you interested in following a self directed career path within a progressive company with an open management style? If you answered yes to any of these questions, then you must consider a career move to Burns & McDonnell. At Burns & McDonnell you are part of a professional team that finds creative solutions to make our clients successful.

Burns & McDonnell, a premier provider of engineering consulting services since 1898, is seeking experienced Structural Engineers to join our team in Kansas City, Missouri. We are seeking top performers with previous experience in the following industries; Power, Process/Refrining, Aviation, Transmission & Distribution, Transportation, Water/

These positions require a BS in Civil Engineering with an emphasis or Masters in Structural Engineering and a minimum 3 years structural design experience. Ideal candidates must be able to perform steel, concrete and foundation design and analysis. Previous consulting experience and PE with SE is preferred.

As an employee-owned firm, Burns & McDonnell offers an excellent benefits package including matching 401k, stock ownership, and professional development opportunities. To apply, please see our website at **www.burnsmcd.com** in the careers section.



# PROJECT MANAGERS, ESTIMATORS, DETAILERS, CNC **PROGRAMMERS**

STROCAL, INC. is looking for dedicated and experienced candidates for all aspects of its business including management positions, contracts managers, and shop fabrication. STROCAL, INC. is a Large Structural Steel Fabrication and Erection Company headquartered in Stockton, CA with an additional facility in Eloy, AZ. We offer excellent wages and great benefits.

> For immediate consideration, please e-mail resume to jobs@strocal.com or contact:

# STROCAL. INC.

2324 Navy Drive Stockton, CA 95206 Fax: (209) 948-4585 www.strocal.com

# **EMERGING ROLES IN STRUCTURAL BIM**

BIM could reach critical awareness in the structural engineering industry this year, and two new BIM roles look poised to go mainstream.

BY MICHAEL GUSTAFSON, P.E.

**ONE OF THE MOST FREQUENT QUESTIONS** I receive from structural engineering firms about building information modeling is: "Who will use BIM tools in their day-to-day work?" After hearing and seeing the various workflows that firms use, I see two roles emerging: the BIM Modeler and the BIM Engineer.

# The BIM Modeler

The BIM Modeler is responsible for a majority of the duties of generating the BIM design and documentation, while also coordinating changes with the project team; larger projects may require several BIM Modelers. Where the design engineer is more detached from the coordination process and has a more responsive role with the actual BIM technology, the BIM Modeler takes on more responsibility for and leadership of design coordination.

The structural drafter, who traditionally uses 2D drafting software to generate documentation for his or her projects, is the prime candidate for the BIM Modeler role. As BIM Modeler, the drafter's role would expand to take on responsibility for most of the project coordination and documentation delivery.

Does the role of BIM Modeler overlap with that of project engineer? A good analogy is the relationship between a football offensive coordinator and quarterback (project engineer and BIM Modeler, respectively). The project engineer generates the game plan of what is going to be done and why. The BIM Modeler is tasked with finding the best way to achieve the goal—and can improvise as needed on the field.

Based on this separation of roles, the BIM Modeler will use BIM tools that are focused on design aspects such as constructability and the related management and documentation of the design. The design engineer will most likely work with his or her structural analysis application and send updates of the design into the BIM model.



Michael Gustafson is Product Manager – Engineering, North America with Tekla, Inc. in Kennesaw, Ga.

# The BIM Engineer

The second emerging role is that of BIM Engineer. The BIM Engineer is a dedicated structural engineer, most likely with two to six years of experience, who is responsible for a majority of the duties of generating the BIM design and coordinating changes with the project team.

Documentation may or may not be generated by the BIM Engineer. Some companies take the approach of having the engineers perform design work and create the design drawings, though the BIM Engineer doesn't have to take on that responsibility. The main difference

between the BIM Engineer and the BIM Modeler is that the former focuses much of the structural design efforts within the BIM model, as well as the coordination with other disciplines.

The BIM Engineer role seems to be evolving in heavy industrial projects where coordination of the structure is more important and more engineering thought has to be put into every design element. Basically, the workflow matches the requirement of the person building the structural model: the need to have the information in place and managed by one person who understands the behavior of the structure.

# What's the Right Path?

Which of these approaches wins out is yet to be determined by the industry. Interestingly, I have seen both approaches put into practice by structural firms. But I think the approach that a firm chooses depends on a few key factors: the level of design repetition on the project, the intensity of structural analysis, and the existing climate of the firm looking to adopt BIM.

The BIM Modeler approach may work well in larger firms where there is already more specialization of duties. The duties of structural analysis are more reactive to the design as opposed to proactively driving it, and the firm already harbors some experienced yet technology-savvy structural drafters.

The BIM Engineer approach fits better in smaller firms where the engineers multi-task the roles of design, analysis documentation, and coordination. The challenge here is for the BIM Engineer to have at his disposal the proper structural analysis tools available during his steps of design iteration.

Depending upon the stage of a project, one method may work better than the other. For example, in the early stages of a project, where engineering decisions are more critical, the BIM Engineer hat might be worn. Then, as the project evolves and major structural decisions have been made, the BIM Modeler takes on the leadership of the project.

Furthermore, a hybrid approach can be taken, where the BIM Modeler concept is used, but design engineers are more actively integrated into the BIM process.

# **Critical Awareness**

Some recent statistics (from a 2007 McGraw-Hill Construction SmartMarket Report) state that the U.S. structural engineering industry will reach a critical point of awareness about BIM in 2008. Reaching such a tipping point seems quite profound when just a few years ago, most structural firms didn't know about BIM. Whichever path is taken, I believe both roles will require a heightened level of responsibility and compensation, as well as knowledge about design—specifically, the effects of economics and constructability on the design.

# RISAFIOOR

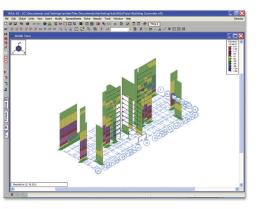
# **Automated Floor Layout and Optimization for Complete Building Systems**

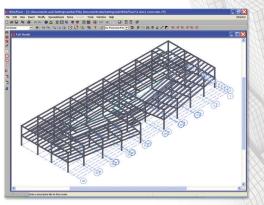
- Steel and Steel Joists (Composite, Non-composite, Partially Composite)
- Reinforced Concrete (T and L Beams, Columns)
- Wood and Wood Products (Dimensional, Glulams, SCL, I-Joists, etc.)

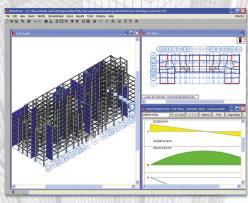
# The Premier Choice for Automated Building Design

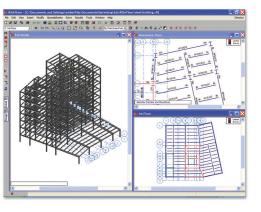
RISAFloor features automatic load attribution based on deck direction, automatic live load reductions, full floor vibration checks, full height column stack design (considering splice locations), export (and import) of CIS/2 detailing files, parent/child relationships between floors, exclusive or additive area loads, concrete rebardetailing, true spreadsheet editing, automatic code based wind and seismic load calculations and much more.

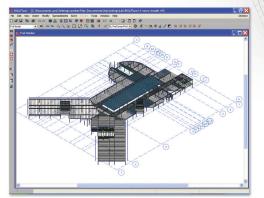
RISAFloor links to RISA-3D for the design of the lateral system and nonstandard building components, and to RISAFoundation for design of the foundation system. You can move effortlessly back and forth between these three programs, creating and modifying your building model in any manner you wish.

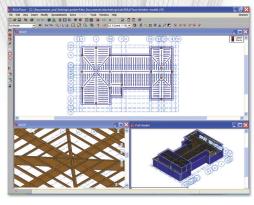












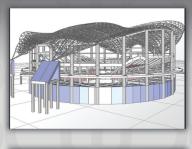
Try RISAFloor today and see how good structural engineering software can be!

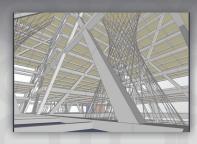


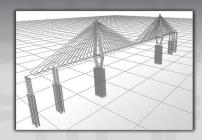
# COMPUTERS & STRUCTURES, INC. STRUCTURAL AND EARTHQUAKE ENGINEERING SOFTWARE

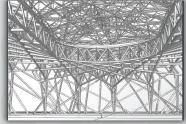
# JAP2∞∞® ETABJ® JAFE™ PERFORM JO®

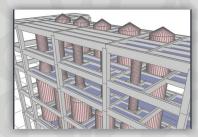
# TECHNOLOGY FOR A BETTER WORLD

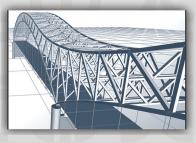








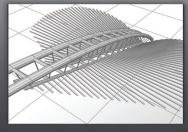


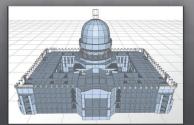


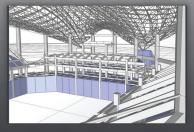












# Stop by and see us at NASCC!

North American Steel Construction Conference - Booth 919 April 2-5, 2008 ~ Nashville, TN



**COMPUTERS & STRUCTURES, INC.** Software for Structural and Earthquake Engineering