

# Modern **STEEL** CONSTRUCTION

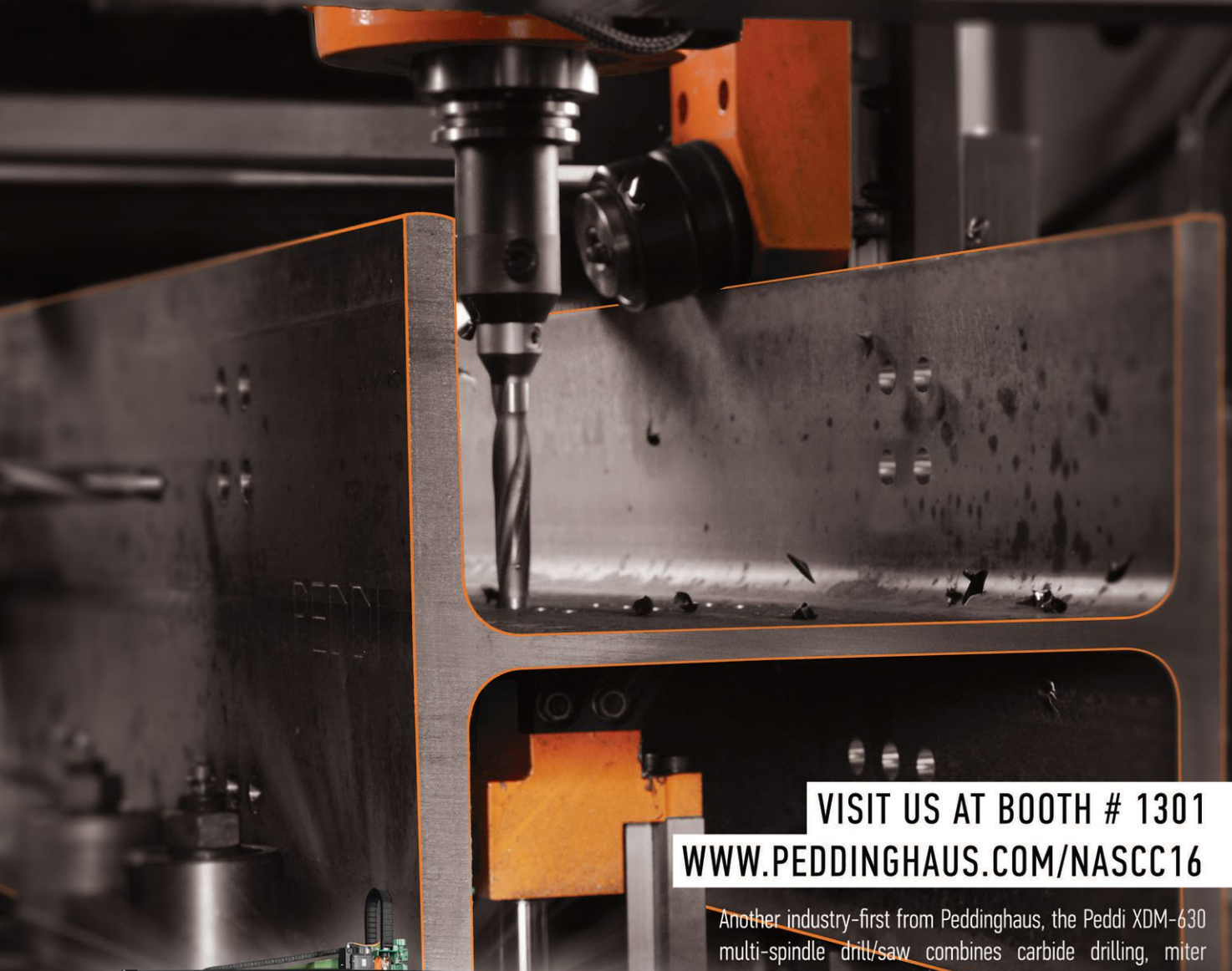
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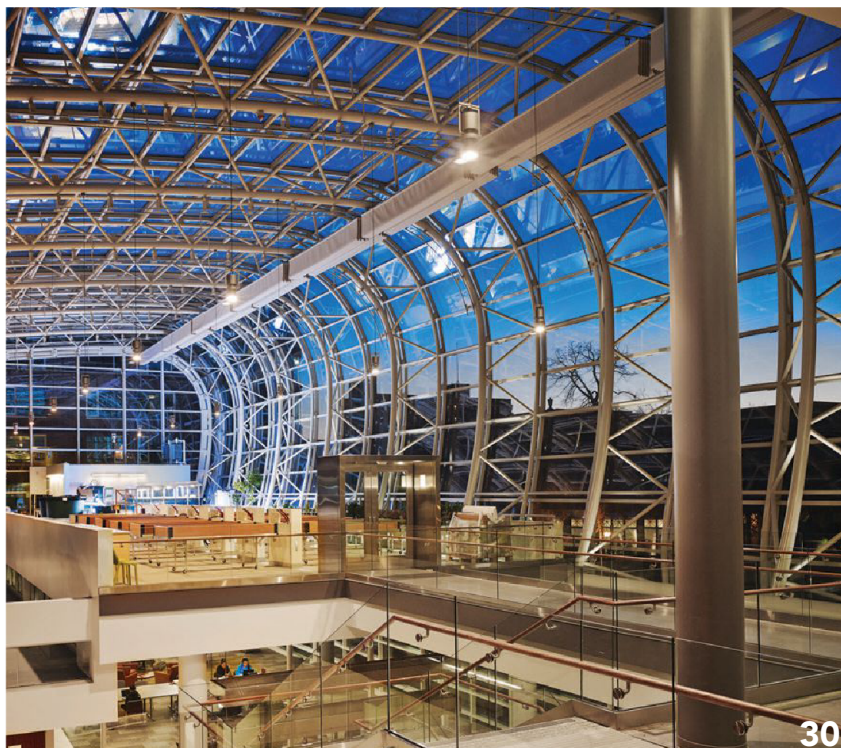
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April 2016



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MODERN STEEL CONSTRUCTION (Volume 56, Number 4) ISSN (print) 0026-8445; ISSN (online) 1945-0737. 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 \$6.00; 1 year, \$44. Outside the U.S. (Canada and Mexico)—single issues \$9.00; 1 year \$88. 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.

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## editor's note



### THE NEWS THAT LUMBER LIQUIDATORS' STOCK IS TUMBLING SHOULD NOT BE SURPRISING TO ANYONE WHO KNEW WHERE THEY SOURCED THEIR MATERIAL FROM.

As *60 Minutes* reported: "Lumber Liquidators is a U.S. company, but much of its laminate flooring was made in China. And as we discovered when we first reported this story in March, it may fail to meet health and safety standards, because it contains high levels of formaldehyde, a known cancer-causing chemical."

This laminated flooring and other wood products are just the latest in a long line of faulty products produced in China. Whether it's fish (antifungal agents harmful to humans), toothpaste (potential poisonings), ceramic heaters (fire hazards), toy trains (lead paint), tires (tread separation issues), pet food (hazardous chemical additives) or more than 300 other reported issues in the past decade, there is a near constant stream of problems with Chinese imports.

Of course, the construction industry is not immune to this issue. It was only a few years ago that many U.S. service centers stopped stocking Chinese HSS over fears about quality issues. And we're all too familiar with the Chinese fabrication quality issues that slowed construction and resulted in massive cost overruns on the San Francisco-Oakland Bay Bridge. And I assume that most of us remember the expensive lawsuits over Chinese drywall and the emissions of sulfurous gases in as many as 100,000 U.S. homes.

A recent CNBC program quoted Rosemary Coates, a well-known consultant on doing business in China and author of "42 Rules for Sourcing and Manufacturing in China" as stating: "[American companies need to] understand that the contract is viewed differently in Asia than in the U.S. We sign and think that's the end, but in China the view is completely opposite. They start cutting corners as soon as production begins." As CNBC explained,

"Chinese suppliers can often be negotiated down to their break-even price, after which they will need to find post-contract strategies to increase their margins."

In the case of private projects, it's clearly just a case of "buyer beware." A company risks its reputation to save money (a figure that's declining with the growth of reshoring in America and the increasing labor costs in China). Public contracts are a different story, though. First, the obligation to consider public welfare is higher when the government is paying the bill. But even more importantly, the economic costs of buying products or services overseas, as opposed to investing in American businesses and American workers, is incredibly high. Decimating your own tax base to save a very few dollars is not a smart move. Or as Dan DiMicco, chairman emeritus and former CEO of Nucor—and author of *American Made: Why Making Things Will Return Us to Greatness*—states: "A country that doesn't create or make or build things is a country doomed to mediocrity. Manufacturing, and the innovation that comes with it, is indispensable to the vitality of a great nation." How much of an impact? Every \$1 spent in manufacturing activity returns an additional \$1.34 in economic activity to the general economy.

While immigration issues may get more play in an election year, the more important issues deal with trade and its impact on the American standard of living. And that should be something everyone—Republican, Democrat or Independent—can agree on.

A handwritten signature in black ink that reads "Scott Melnick".

**SCOTT MELNICK**  
EDITOR

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## steel interchange

### Shop Primer

**We have always specified shop-primed steel, but we are being challenged as to why. Can you provide more information related to this topic?**

The AISC Engineering FAQs address this issue:

#### 10.1.1. When must structural steel be painted?

As stated in the 2005 AISC *Specification* Section M3.1: "Shop paint is not required unless specified by the contract documents." Therefore, fabricated structural steel is left unpainted unless painting requirements are outlined in the contract documents.

In building structures, steel need not be primed or painted if it will be enclosed by building finish, coated with a contact-type fireproofing or in contact with concrete. When enclosed, the steel is trapped in a controlled environment, and the products required for corrosion are quickly exhausted. As indicated in the 2005 AISC *Specification* Commentary Section M3.1, "The surface condition of steel framing disclosed by the demolition of long-standing buildings has been found to be unchanged from the time of its erection, except at isolated spots where leakage may have occurred. Even in the presence of leakage, the shop [primer] coat is of minor influence (see page 391, Bigos, Smith, Ball and Foehl, 1954)1." A similar situation exists when steel is fireproofed or in contact with concrete; in fact, paint is best omitted when steel is to be fireproofed because primer decreases its adhesion.

In exterior exposed applications, steel must be protected from corrosion by painting or other means. Likewise, steel must be protected from corrosion in special applications such as the corrosive environment of a paper processing plant or a structure with oceanfront exposure.

The referenced Bigos, Smith, Ball and Foehl article cites a critical relative humidity of 70% and asserts that below this level, steel will not corrode.

I can provide some further back-up for the idea that the relative humidity in an enclosed heated space will be less than 70%. Per the EPA's recommendation, "The ideal levels of humidity for your living space will be less than 60% in the summer and between 25% to 20% in the winter."

It should be noted that there are a number of variables involved. Tullmin (2000) adopts a value of 60% and states: "The critical humidity level is not a constant. It depends on the corroding material, the tendency of corrosion products and surface deposits to absorb moisture and the presence of atmospheric pollutants." So, the guidance applies only

to typical buildings. It would not apply to structures subjected to corroding chemicals—some industrial structures, for instance—even if they are enclosed and heated.

In closing, probably the best defense that can be given for the guidance is that it seems to be given worldwide and has stood the test of time. British, Canadian, Australian and European documents seem to provide similar guidance.

Here are the cited references:

- Bigos, J., G.W. Smith, E.F. Ball and P.J. Foehl, 1954, "Shop Paint and Painting Practice," Proceedings of the 1954 AISC National Engineering Conference, AISC, Chicago, IL.
- Tullmin, M. and Roberge, P.R. (2000), "Atmospheric Corrosion," Chapter 18 in *Ublig's Corrosion Handbook*, 2nd Ed., John Wiley & Sons.

Larry S. Muir, P.E.

### Blocking, Chipping and Coping

**What is the difference between blocking, chipping and coping?**

With the exception of "cope," the terms are informal and their usage may vary. Cope is defined in the *Specification* as: "Cutout made in a structural member to remove a flange and conform to the shape of an intersecting member." In my experience, cope is typically used when the entire width of the flange (and some portion of the web) is removed over some length of the member. Block is used when a portion of the flange (but none of the web) is removed over some length of the member. Cut is obviously a pretty general term.

The 3rd Edition of AISC's *Detailing for Steel Construction* provides the following information in a section titled "Cutting for Clearance," which states:

"Figure 7-28 indicates that the W18×60 and the W21×73 are "flush top"—i.e., the tops are at the same elevation (+98' -6). Therefore, the south end of the W18 must be notched at the top, as shown in Figure 7-32b, to prevent interference with the flange of the W21. Such a notch is called a cope, block or cut. Some shops dimension such cuts while others show a standard cope mark that establishes the required dimensions."

So you can refer to this as a cope, block or cut. "Cut and chip" (or "block and chip") can refer to cutting and then chipping the flange off flush with the web. Chipping refers to the use of a pneumatic chisel to remove steel that projects from the face of the web. Chipping can be expensive and unnecessary. Depending on the connection, you may be able to avoid chipping by using a filler plate on the web to keep the connection clear of any steel that projects beyond the web.

Carlo Lini, P.E.



# steel interchange

## Oversized Holes and Bearing Connections

The AISC and RCSC specifications do not permit the use of oversized holes in bearing-type connections but do allow short and long slots as long as the slot is perpendicular to the applied load. If the connection is subject to load reversal, this restriction on oversized holes makes sense to me, as it eliminates “slop” in the connection. However, if the connection is supporting a load in a single direction (not subject to load reversal), I do not understand this restriction. Can you please clarify why an oversized hole should not be used in this condition?

You have already stated the AISC *Specification* requirements, and I cannot advise you to violate the *Specification*. However, Section A1 states: “Alternative methods of analysis and design are permitted, provided such alternative methods or criteria are acceptable to the authority having jurisdiction.” This allows some latitude.

For the majority of conditions, the *Specification* prohibition on the use of oversized holes in bearing joints makes sense. Even if you had a relatively simple case like a shear connection, the use of the oversized holes could have an impact on the erection tolerances in the *Code of Standard Practice*.

A good case to consider might be a column base plate, where oversized holes are used but the anchors cannot be effectively pretensioned. In this case, AISC generally discourages taking shear in the anchors. When shear is taken in the anchors, we recommend the use of welded washer plates with standard holes. The washer plates eliminate uncertainty about the distribution of force among the anchors. Other industries, and standards, take a different approach. They might neglect some of the anchors entirely or reduce the overall capacity by some factor, presumably based on empirical models.

The primary reason to use oversized holes would seem to be to allow a greater tolerance. The need for a greater tolerance might also indicate uncertainty about achieving bearing at all of the bolts, which in turn might require assumptions about the force distribution.

The distribution of load among the bolts is much clearer with either standard holes or slip-critical joints.

Larry S. Muir, P.E.

## Hanging Loads from Existing Holes

The situation I’m currently addressing has only one bolt, so the load distribution is not a concern. The condition involves hanging loads from existing holes. The diameter of the hole is 1 $\frac{3}{8}$  in., so there is no bolt for which this hole would be considered “standard.” Since the 1 $\frac{5}{8}$ -in. hole is only slightly oversize for a 1 $\frac{1}{2}$ -in. bolt, it seemed reasonable to allow it. However, the *Specification* seems to prohibit this condition. I would like to make an informed

decision based on my own judgment relative to this condition. Do you have any further thoughts given this additional information?

I would tend to treat your situation as one that is not considered by the *Specification* as opposed to one that is specifically prohibited. Ultimately, you have to use your own judgment. I will provide some thoughts.

One difference between a single bolted connection and a pin is related to the increased clamping provided by the bolt (even a snug-tight bolt) as compared to a pin. I am assuming you have a bolted connection in this respect. The *Specification* provides different bearing equations for pin-connected joints versus bolted joints.

Another consideration might be relative movement of the parts under load. Section D5.2 of the *Specification* states: “When the pin is expected to provide for relative movement between connected parts while under full load, the diameter of the pin hole shall not be more than  $\frac{1}{2}$  in. (1 mm) greater than the diameter of the pin.” In order to understand this requirement you might want to refer to (Johnston, 1939) cited in the Commentary. I will assume you do not have relative movement of the parts under load.

If the assumptions stated above are correct, then I have good news for you. The 2016 *Specification*, which will be published later this year, will give the standard hole diameter for bolts 1 in. and greater as the bolt diameter plus  $\frac{1}{8}$  in.

Larry S. Muir, P.E.

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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 [www.modernsteel.com](http://www.modernsteel.com).

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Larry Muir is director of technical assistance and Carlo Lini is a staff engineer—technical assistance, both with AISC.

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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 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:

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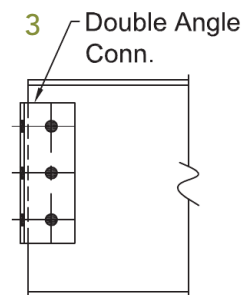
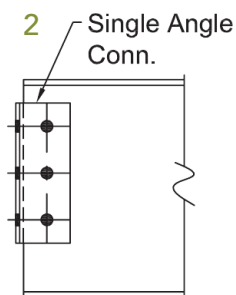
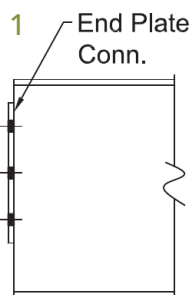


## steel quiz

This month's Steel Quiz takes a look at different types of shear connections and compares the advantages and disadvantages of each type.

Detailed guidance is provided for all of these typical simple shear connections in Part 10 of the AISC *Steel Construction Manual*. Those discussions will help you maximize the usefulness of each connection, minimize the sensitivity of each to its disadvantages and make use of the details that best suit the needs for a given connection and given project. You also can help yourself quite a bit by talking to your fabricator, because they will all have their own list of advantages and disadvantages for each connection type. It will be worth the dime and your time!

Match each connection with its corresponding advantages and disadvantages below. (The quiz continues on page 14 with another set of three connections and advantages/disadvantages.)



**A Advantages:** Can eliminate erection problems due to double-sided connection and fewer parts. The all-bolted configuration is often considered the most economical shear connection.

**Disadvantages:** Limited strength, low strength relative to transferring axial loads.

**B Advantages:** Few parts, few bolts.

**Disadvantages:** Requires stability angle, weak-axis yielding of the column web may govern when connected to the column web.

**C Advantages:** One -sided.

**Disadvantages:** Connection can be heavy, stiffer than other types except for single-plate connections.

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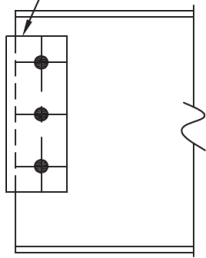
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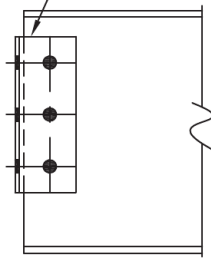


# steel quiz

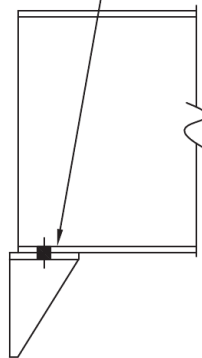
4 Single Plate Conn.



5 WT Conn.



6 Stiffened Seated Conn.



**D Advantages:** Simple (few parts), no holes in beam.

**Disadvantages:** Less tolerance on beam length may require the use of shims.

**E Advantages:** Simple (few parts), no welding on beam, efficient transferring axial forces.

**Disadvantages:** Stiffer than other types of shear connections, requires explicit consideration of rotational ductility.

**F Advantages:** High-strength.

**Disadvantages:** Double-sided connections into column webs can be an erection problem/safety issue.

ANSWERS 1B 2A 3C 4F 5E 6D



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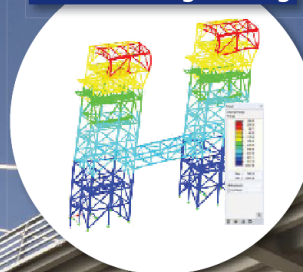
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## MAKE NETWORKING WORK FOR YOU

BY ANNE SCARLETT

A robust and focused networking strategy is one of the oldest and most effective ways to demonstrate your value to potential clients.

### WHO DOESN'T LOVE a good referral?

After all, when someone has referred your services to a prospect, it means you've been vetted—there's a predetermined trust attached to that referral. And let's face it, in comparison to the traditional business development process, referred business takes less time, costs less money and requires less pre-work. And to sweeten the deal, referred business often results in *more*—more scope, more connection, more trust. So, less effort for more reward.

Sounds good, yes? But now you may be asking: How do we go about getting referrals? Becoming a truly “referable” professional is another conversation altogether. (For details, see “How to Generate Referrals and Testimonials” in the Articles section at [www.annescarlett.com](http://www.annescarlett.com).) In a perfect world, all of your past clients will refer prospects to your firm. But in addition, referrals can stem from word-of-mouth, aka your network.

Yet what if you don't have a strong, active network? Maybe it's time to get on it. Building and nurturing a network is an ongoing process; it honestly never ends. And while I completely relate to those of you who would prefer not to proactively engage with “strangers” or even acquaintances, we must embrace engagement as a part of doing business in our service-providing industry.

### Give and Get

In networking, you have to give (a lot) in order to (possibly) receive. It's about helping others, with the hope that down the road, others will help you. It's not quid pro quo. It can be unbalanced. But the net result—when both parties are well-intentioned and authentic—will most certainly glean positive results. Furthermore, you'll discover that helping others is both professionally, and personally, rewarding.

Being visible—professional organization meetings, civic activities, attending conferences (such as this month's NASCC: The Steel Conference in Orlando), etc.—is only the beginning. After you “grin and grip” and exchange cards, keen follow-up will be your ticket to nurturing a successful networking relationship.

Yet, there's not enough time in the day to follow up equally with everyone we meet. How do we make the process less daunting? I suggest organizing networking contacts into different loose categories: buyers (prospects/existing clients), influencers and informants.

**Buyers.** Your services are directly relevant to their needs. These folks can, or already have, hired your company.

Your offer to buyers: industry insights, professional advice, warm introductions to your expansive network or referrals (when they have a need that your firm cannot fulfill).

**Influencers.** These folks can impact the decisions of your prospective buyers. They will not have a direct need for your services.

Your offer: warm introductions to your expansive network or potential referrals.

**Informants.** This will likely be your largest group of contacts. They are virtually everywhere. These folks rarely directly buy—nor influence the buyers of—your services. They can, however, provide information and access to their own network. And guess what: Your company colleagues are informants. Industry peers are terrific informants. People from your “past life,” such as classmates, professors, bosses, coworkers or extra-curricular peers also serve as informants. Even your family and friends are informants. And believe me, I completely relate to any hesitations regarding mixing business with personal life. But ultimately, you'll be glad that you have at least educated them on what you do and the value that you offer. So don't leave them out of your official network!

Your offer: warm introductions to your expansive network or potential referrals.

### Eight Tips

In addition to dedicating time proportionally, based loosely upon each contact's “category,” here are an additional ten tips to consider when networking:

**Determine your networking capacity.** How many people might you be able to comfortably stay in contact with, particularly on a meaningful level? Don't spread yourself too thin; typically, the most effective networks are more about quality than quantity. Think about how many relationships you can maintain by email and phone, on social media and in person.

**Develop a system for maintaining and growing.** In networking, absence doesn't make the heart grow fonder; it has

**Anne Scarlett** is president of Scarlett Consulting, a Chicago-based company specializing in AEC-specific strategic marketing plans, marketing audits and coaching. She is also on the adjunct faculty of Columbia College of Chicago and DePaul University. She can be contacted via her website, [www.annescarlett.com](http://www.annescarlett.com).





## business issues

the opposite effect! So rough out a multifaceted “touch” plan, to ensure you’ll carve out the time on a regular basis. Some contacts, particularly the buyers, may need increased nurturing—often in the form of face time.

**Be clear on what you offer, both professionally and socially.** Networking is not selling. Sales pitches, even subtle ones, won’t help you to build your relationships. So what will your conversations entail? In addition to being inquisitive and aiming to make it about them and/or finding common ground, you’ll also need to articulate what you offer.

**Practice your conversation skills.** Behave like an investigative reporter by asking open-ended, probing questions. In addition, share enough about yourself so that you demonstrate an open, humble vulnerability—but take care not to repeat yourself or pontificate. In summary, aim to be brief about yourself while listening intently to what they offer up. When starting a conversation at industry events, I’ll often approach someone who is standing alone on the sidelines. They are typically appreciative of the outreach!

**Position yourself in scenarios where you can be genuine.** Feigned interest is obvious. No one has time for that. So don’t waste their time or yours. Instead, gravitate towards groups, activities and events where you can keep it real.

**Be mindful of the goal and patient for the outcome.** It’s rare to meet someone who immediately wants to buy services from you. Give it time, but also take care not to let someone from your network suck you dry in terms of your time, infor-

mation and introductions. (Oh, the stories I could tell about networking mooches!) If, over time, they continue to take from you—without an effort to reciprocate on any level whatsoever—then it’s time to cut them loose.

**Social media is an important piece of the larger networking puzzle.** Online communication options are the perfect vehicles to drive your initial face-to-face contact forward. If you “meet” someone online first—in a LinkedIn discussion group, for example—this is a great springboard to meet in person sooner rather than later.

**That said, recognize that social media is *not* a replacement for networking.** Is IRL (in real life) networking obsolete? Isn’t online networking enough? In short, no and no. Without an expansive reach and a committed approach to remain active online, your social media efforts won’t even come close to what you can achieve in real-life networking. Even if you have a substantial, active online presence (do you?), social media does not replace the face-to-face connections that are imperative for service providers like us. After all, these clients will eventually be working directly with us on projects. The best way for them to gauge the potential for a productive, positive synergy is by spending time together. Bottom line: The rapport and trust that comes with real interaction is irreplaceable.

The merits of networking have stood the test of time. Make sure that you’re maximizing them within your own professional life. ■



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Architectural vision and high seismic demands culminate in architecturally expressed megabraces for the most resilient skyscraper on the West Coast.

# Braced for the FUTURE

BY IBBI ALMUFTI, S.E., BOB HAZLETON AND KRISTY DAVIS

**THE SAN FRANCISCO SKYLINE** is soaring to new heights as the city's tallest mixed-use building rises in one of its most dynamic neighborhoods.

The project, simply known by its address, 181 Fremont, is currently under construction in the South of Market neighborhood (aka, SoMa). With its proximity to the financial district, Bay Area Rapid Transit (BART) and Caltrain stations, the Bay Bridge and major highways, SoMa is a haven for new development and is currently seeing a boom of office and residential projects. When completed next year, 181 Fremont, at approximately 800 ft, will be the second-tallest building in San Francisco, after Transamerica Pyramid; neighboring Salesforce Tower, also under construction, will surpass both buildings when complete. 181 Fremont contains 56 levels of office and residential space. The bottom 36 levels will make up 435,000 sq. ft of Class A office space while the upper levels will house 67 luxury condominiums.

## Design Drivers

The building's location and geometry presented challenges for the design team from both a wind and seismic perspective. The tower is very slender, with a 100-ft by 100-ft footprint at the base that gradually tapers, and the architectural vision includes a faceted façade that folds along visually expressed diagonal lines. To preserve floor area, a traditional core was out of the question. The designers instead chose external megabraces to resist the shear demands in the office levels and standard buckling restrained braces (BRBs) in the residential levels.

Often, tall building projects in San Francisco take an exception to local code height limits. Specifically, owners are keen to avoid the code requirement for back-up moment frames, a requirement that also includes a performance-based analysis to verify that the design complies with the minimum perfor-



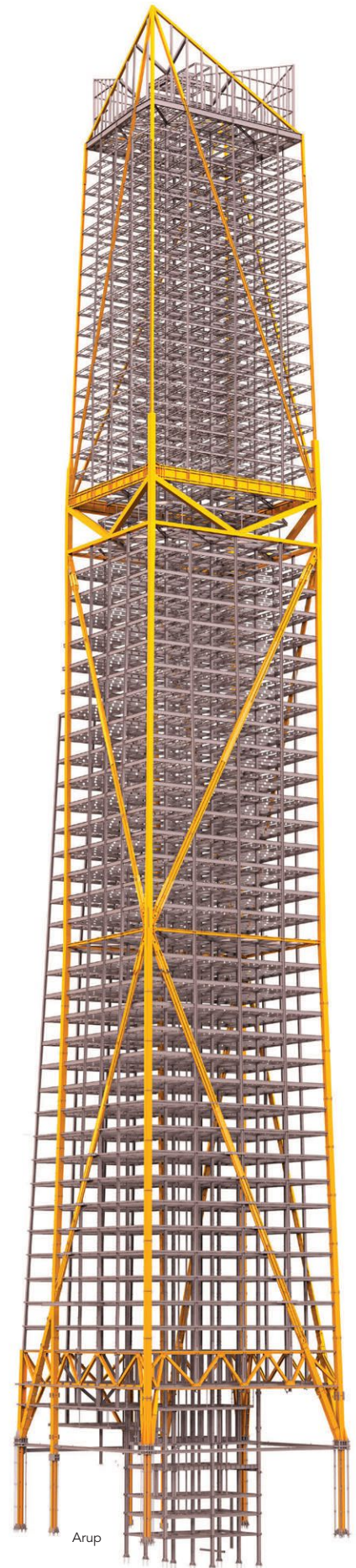
**Ibbi Almufti** ([ibrahim.almufti@arup.com](mailto:ibrahim.almufti@arup.com)) is an associate in the Advanced Technology and Research group with Arup in San Francisco, **Bob Hazleton** ([bobh@herricksteel.com](mailto:bobh@herricksteel.com)) is president of The Herrick Corporation and **Kristy Davis** ([davis@aisc.org](mailto:davis@aisc.org)) is AISC's Pacific Northwest regional engineer.





◀ ▶ 181 Fremont contains 56 levels of office and residential space. The bottom 36 are office space while the upper levels house luxury condos.

▶ ▶ External megabraces (yellow at right) resist the shear demands in the office levels, and standard BRBs were used for the residential levels.







- ▲ A cantilevered safety net protects an adjacent building.



- ▲ 181 Fremont will be the second-tallest building in San Francisco, after Transamerica Pyramid; neighboring Salesforce Tower will surpass both when complete.



mance objectives intended by the code. While performance-based analysis is more robust than the standard prescriptive design approach, it does not imply higher performance, which is simply “life safety” in a design-level earthquake and collapse prevention in a maximum considered earthquake (MCE). This means that although the occupants of the building should be

able to exit the building, it is likely that the building has sustained significant damage, preventing it from being usable or even repairable.

But the building’s owner, Jay Paul Company, wanted more in terms of seismic performance. As such, the company opted to use Arup’s (the project’s structural engineer) Resilience-based



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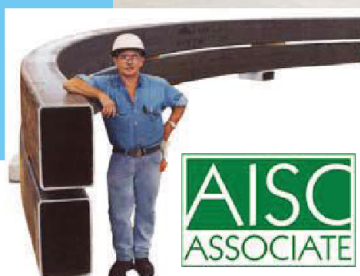
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▲ The building uses approximately 9,000 tons of structural steel.



▲ Steel could only be erected from Fremont Street, and an assist crane was used for heavier picks at the back of the building.



Earthquake Design Initiative (REDi) rating system, which proposes an enhanced seismic design framework for buildings focusing not just on occupant safety but also on continuing the life of a building even after a major seismic event (search for “REDi” at [publications.arup.com](http://publications.arup.com)). Jay Paul was focused specifically on achieving the Gold level, which corresponds to the

building being able to withstand virtually no structural damage, minimal non-structural damage and immediate reoccupancy following a 475-year earthquake. The project was also subject to a rigorous seismic review process required by the City of San Francisco since performance-based seismic analysis was used to justify the design.

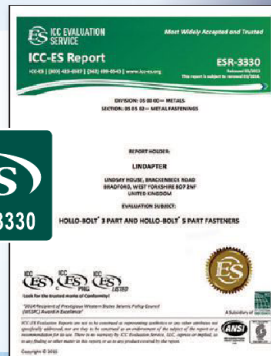
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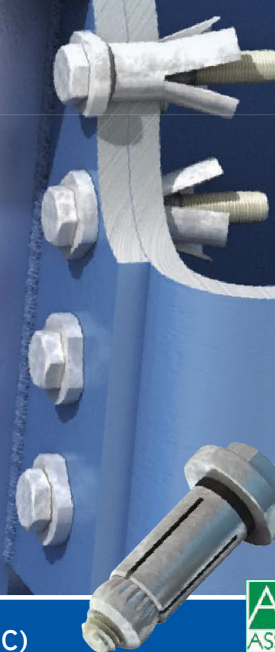
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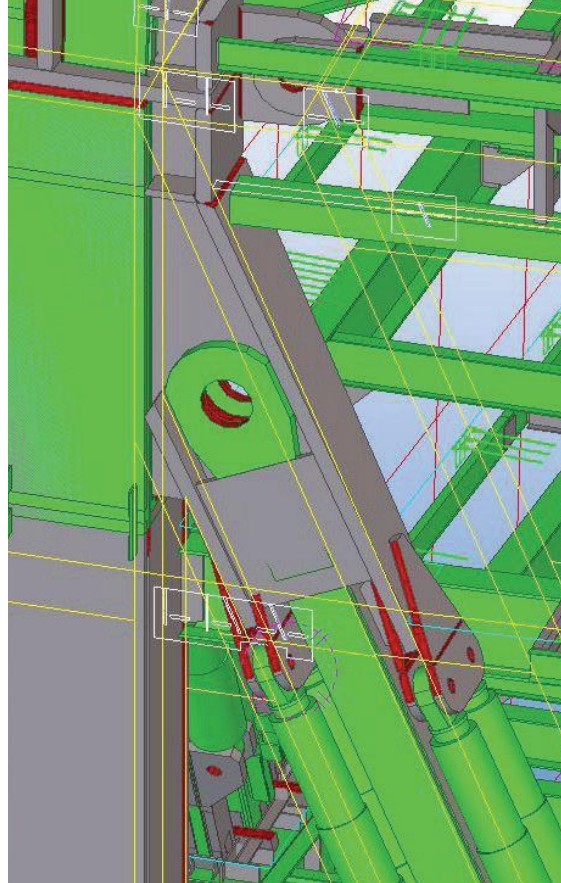


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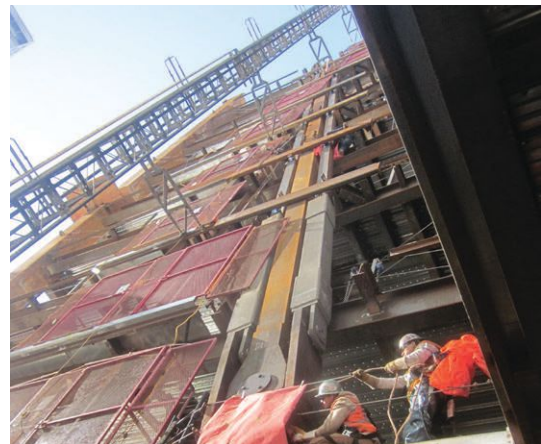
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▲ ▼ Each of the externally exposed megabraces in the office levels is 200 ft to 250 ft long, extending across multiple floors to the meganodes. The megabraces comprise three braces in parallel: a primary brace with a secondary brace on either side.

◀ ▲ The external damped megabrace system eliminated the need for the TMD and introduced an uplift mechanism at the base of the megacolumns to eliminate tension demands in the foundation. Instead of stiffening the building, the design actually reduces stiffness, elongating the building period to reduce seismic demands accordingly.



## Wind Vibration

Because the residential units are at the top of the building, wind vibration was a significant concern for occupant comfort. While tuned mass dampers (TMD) are often employed at or near the roof to mitigate wind vibration in tall buildings, Arup sought alternative solutions for multiple reasons. First of all, while TMDs are effective in reducing wind vibration, the damping they generate is not considered for reducing ultimate wind or seismic design forces. Secondly, TMDs are expensive since they take up valuable real estate at the top of the building—especially one as slender as 181 Fremont. Lastly, they are very heavy and reducing the building's weight was of upmost importance in the interest of reducing gravity and seismic demands.

So how did the design team eliminate 25% of the steel (3,000 tons) relative to a more conventional design while achieving stringent wind occupant criteria and enhanced seismic resilience objectives? They implemented an external damped megabrace system, eliminating the need for the TMD and introducing an uplift mechanism at the base of the megacolumns to eliminate tension demands in the foundation. In other words, instead of stiffening the building, they actually reduced the stiffness, elongating the building period to reduce seismic demands accordingly. As more steel was removed from the design, the building got lighter, and the seismic mass and related demands decreased. This cycle was repeated until Arup found an optimized design. In addition, eliminating the TMD freed up an entire floor; the

mechanical penthouse was relocated to the roof, thus opening up the penthouse level for a luxury condominium unit.

## Megabraces

Each of the externally exposed megabraces in the office levels is 200 ft to 250 ft long, extending across multiple floors to the meganodes. The megabraces comprise three braces in parallel: a primary brace with a secondary brace on either side. The primary brace is a built-up box section (14 in. by 16 in.) with variable thickness (~2 in.) and the secondary braces are essentially 9-in. by 9-in. boxes built-up from steel plate. The primary brace is fixed rigidly to the meganodes at either end of the brace, and the secondary braces are fixed only at one end while the other end is attached to a viscous damper, which in turn is attached to the meganode.

While the strains are generally low in the primary brace, the total axial deformation accumulated over its entire length can be significant. To maintain deformational compatibility, the secondary braces must extend the same amount, though the majority of the deformation is concentrated in the damper itself. This generates a tremendous amount of damping, on the order of 8% of critical (far greater than the inherent damping in tall buildings considered for wind or even seismic conditions). The viscous dampers do double-duty, reducing both seismic and wind demands, as well as reducing wind vibrations. To protect this system in an MCE, BRBs produced by Star Seis-



mic (now CoreBrace) are placed in the load path of the primary and secondary braces to act as fuses. This limits the amount of force in the primary and secondary braces and megacolumns, ensuring that they will remain elastic in an MCE, and also prevents the dampers from exceeding their capacity—i.e., when the dampers exceed their stroke capacity of  $\pm 6$  in., the BRB will yield before the damper metal casing capacity is exceeded. The largest BRB was comprised of four units bundled together to form a single 5,000-kip-capacity BRB.

One specific challenge with the BRBs was determining how to keep them from buckling while simultaneously letting them move independently from each other and from the floors along their axis (a requirement of the damped megabrake system). Extensive coordination was required from the design team to find a solution that would fit within the curtain wall and glass skin system, which had largely been designed prior to the finalization of the structural system.

Arup designed a megabrake “cage” solution that allowed the braces to move freely along their axes relative to the floor while still providing lateral restraint. This was achieved by using polytetrafluoroethylene (PTFE) bearings attached to a built-up steel shelf, which was in turn attached to the perimeter moment frames. Mirror finish stainless steel was attached to each of the braces opposite each PTFE bearing, which allowed up to 10 in. of sliding between the braces and the floor system. Adding to the complexity of the system, the tapering, faceted geometry of the tower and the proximity of the brace to moment frame columns meant that no two cages were exactly alike.

In addition to the megabrake system itself, perimeter moment frames inset from the megabrakes are used to resist the inertial seismic loads at each floor in the office level; this allows the megabrakes to pass by the moment frame beams and columns. The moment frames transfer the loads up and down to the meganode locations and down through the megabrakes. In the upper residential levels, the lateral system comprises internal core BRBs. Keeping the lateral system in the core of the building eliminated the need for perimeter moment frames, initially with 24-in.-deep beams and now using 14-in.-deep perimeter beams. This increased the floor-to-ceiling window height and reduced column sizes. As a result, the luxury condominium units boast 13-ft, 4-in. floor-to-floor heights, providing spectacular views of San Francisco and beyond.

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### Megacolumns

Once the lateral system was optimized, the design team was able to finalize the design of the megacolumns, which are designed to remain elastic in an MCE (1.5 times mean MCE demands for many of the structural components). The large seismic demands required built-up plate box columns, as large as 36 in. by 36 in. by 5 in. at the base. In order to verify material availability, Herrick, the project's steel fabricator and erector, met with the design team and a metallurgist at Dillinger Hutte (an ArcelorMittal company) in Germany, which provided the heavy plate. The large demands also prompted the design team to use 65-ksi material in order to save on steel tonnage. Each megacolumn required extensive erection coordination and planning, with the heaviest pick being 52.5 tons.

The foundation supporting the megacolumns is a piled raft with a 3-ft-thick mat supported by 42 drilled shafts, 5 ft to 6 ft in diameter that extend approximately 250 ft to bedrock and are then socketed into the bedrock a distance of 20 ft to help control settlements. In addition, due to the fact that the also-under-construction Transbay Transit Center (TTC) is adjacent to 181 Fremont, complex soil-structure interaction modeling—using 3D nonlinear dynamic analysis in LS-DYNA software—was required to check interaction of the two buildings' foundations and confirm that any demands imparted to the TTC from 181 Fremont would not invalidate the performance objectives of the TTC.

The megacolumns are supported by large pilasters formed by embedding steel cruciform sections in the corners of the basement walls, which extend five levels below ground. The general contractor, Level 10, was keen to reduce or eliminate a steel truss that was embedded in the pile cap and would account for potential schedule delays. Arup sought a solution by allowing the megacolumns to uplift slightly at their base in an MCE (an M8.0 on the San Andreas fault). The bases of the megacolumns were prestressed down with 3-in. rods that extended to the bottom of the foundation such that no uplift occurred under design-level earthquake or wind demands. To allow uplift, the megacolumns were detached from the foundation along a

▶ ▲ The tower is very slender, with a 100-ft by 100-ft footprint at the base that gradually tapers, and the design incorporates a faceted façade that folds along visually expressed diagonal lines.

plane, below which a steel cruciform provided the support for the megacolumn base plate. Across that plane, shear had to be transferred in the event of uplift.

Arup devised a shear key that resembles a solid steel “hockey puck” that floats inside circular holes in the megacolumn base plate and the top of the steel cruciform column. Given that this was a crucial component, it was designed for more than 6 in. of uplift, even though the nonlinear response history analyses indicated an uplift of 1 in. on average. By allowing the building to rock and uplift in a big earthquake, this solution relieves forces in the building and also reduces large tension demands at the foundation. This change eliminated the costly steel truss and reduced reinforcing requirements in the basement walls and piles.

Access to the site for erecting steel was only available from Fremont Street. An assist crane was used for heavier picks at the back of the building when working at lower elevations. At level 20, two large nodes exceeded the capacity of the tower crane at the required working radius. The pieces were lifted to elevation with the tower crane and then transferred to a gantry crane, and the gantry crane was used to move the pieces horizontally to the appropriate grid. A factor further complicating erection was the presence of a day-care facility on an adjacent roof. This prompted the cantilevered safety net that protects the day-care center to be load tested at by Level 10 before being assembled on-site.

In addition to enhancing the San Francisco skyline, 181 Fremont will provide much-needed office and housing in one of the most desirable and accessible neighborhoods in the city as well as protect occupants and the building itself via unprecedented resilient seismic design. ■

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# GREEN Connection

BY RANDALL HERBSTMAN, S.E.

A modern greenhouse links old and new construction on an urban college campus.

**STARTING IN 2007**, Loyola University Chicago embarked on a seven-year, multi-building expansion to its North Shore Campus.

The growth spurt kicked off with a new electronic library, the Information Commons, then continued with the Norville Center, an addition to the basketball arena; Cuneo Hall, a new academic building; the Damen Student Center; a new permanent seating bowl inside the school's basketball arena; and a new dormitory. The latest addition is the Institute of Environmental Sustainability (IES).

A living/learning building, the IES combines academic and residential functions to create a unique and transformative educational experience. The academic portion of the 215,000-sq.-ft building is a multi-disciplinary, research-based facility that includes classrooms, research and teaching labs, a clean energy lab, an aquaponic farming display and a greenhouse. The residential portion of the program—San Francisco Hall—provides freshman and sophomore student housing along with a café and recreation areas. The existing Wright Hall and Chapel have been renovated and expanded into academic and administrative offices and form the northern end of the IES. San Francisco Hall forms the southern end of the facility and the Winter Garden links the two buildings.

The 20,000-sq.-ft expansion of Wright Hall and the 16,000-sq.-ft Winter Garden, the centerpiece of the project,

both use structural steel framing; the Wright Hall expansion used ASTM A992 wide-flange columns and floor framing with composite metal deck slabs. W27×84 shapes were used to span the 30 ft between columns in the expansion because they allowed for smaller foundations in the new building, which wouldn't interfere with the foundations of the adjacent existing buildings. Some of these were spread footings next to the existing structure and some were micropiles that were placed from inside the existing basement. Unreinforced web penetrations were provided in many floor beams, allowing the MEP systems to easily route above the ceiling, which was set just below the steel framing.

The Winter Garden link between San Francisco Residences and the Wright Hall expansion is a two-story structure that includes a curving steel framed glass roof. The second floor of the structure (steel framing with a composite metal deck slab) forms the floor of the greenhouse and an aquaponics farming display. Since the greenhouse is a naturally ventilated space, PEX tubing was run throughout the composite slab to provide supplemental radiant heat during the colder months of the year.

Several roof forms were considered during the design process; all were steel frames because a high level of transparency was required for the greenhouse. The final system chosen comprised trusses with a triangular cross section: two top chords,



◀ ▲ The two-story Winter Garden includes a curved steel-framed glass roof. The second floor forms the floor of the greenhouse and an aquaponics farming display.

**Randall Herbstman**  
([rherbstman@hpse.com](mailto:rherbstman@hpse.com)) is a project engineer with Halvorson and Partners in Chicago.







Halvorson and Partners

▼ Erecting the HSS framing for the Winter Garden.



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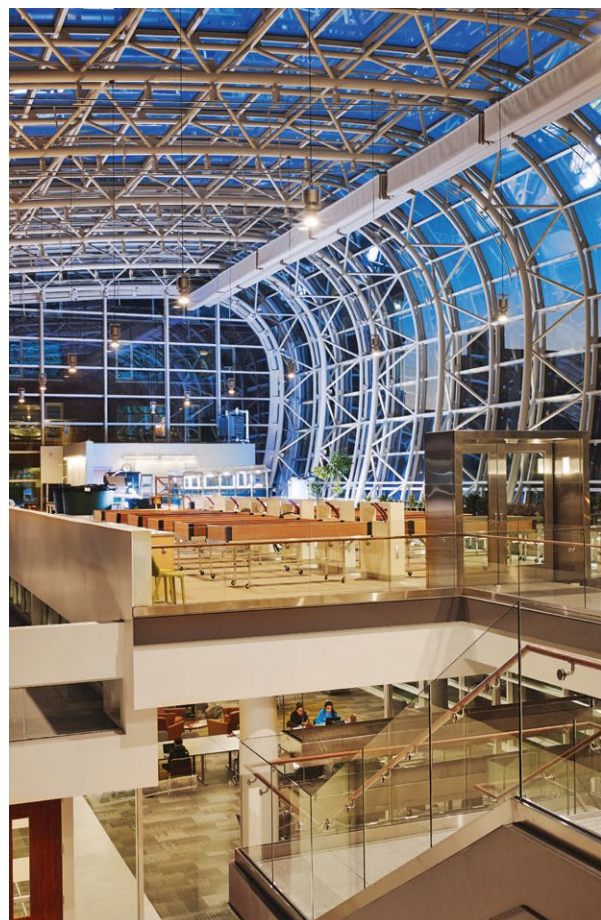
The Institute of Environmental Sustainability strives to create solutions to stresses on the planet's natural resources, expanding knowledge through teaching, research and sponsoring outreach activities on pressing environmental issues such as global climate change, food production and distribution, conserving and recovering biodiversity, restoring ecosystem function, identifying emerging environmental contaminants and privatizing natural resources. The facility includes:

- ▶ The largest geothermal complex in Chicago—90 geothermal wells, 500 ft deep—providing over 700 tons of cooling energy
- ▶ Rainwater collection and reuse for greenhouse irrigation
- ▶ A three-story high vertical farming element
- ▶ Sustainable food systems and urban agriculture research projects and production labs
- ▶ A clean energy lab that will allow the biodiesel program to increase fuel production by up to 100,000 gallons per year



Halvorson and Partners

- ▶ Winter Garden trusses are each supported by a single pinned connection to the concrete roof of the north section of San Francisco Hall.
- ▶ Using steel instead of concrete (like the neighboring structures) allowed the design team to incorporate smaller foundations.
- ▶ The Institute of Environmental Sustainability is meant to serve as a living/learning building that combines academic and residential functions.



each HSS3.500×0.258, and a single bottom chord a HSS8.625×0.500; all diagonals that connect the chords are also HSS3.500×0.258.

Bender-Roller Chicago Metal Rolled Products used a three-roll, pyramid bending process to curve the 36 tons of HSS to various radii from 250 ft to 12 ft. The structure is made up of 27 pieces of 8-in. HSS (bottom chords) equaling roughly 840 ft of curved steel. Running parallel to this are 54 pieces of 5-in. HSS (top chords) that help make the triangular truss shape. To ensure that the structure met erection tolerances, the round HSS were curved to very tight tolerances. In addition to the radius





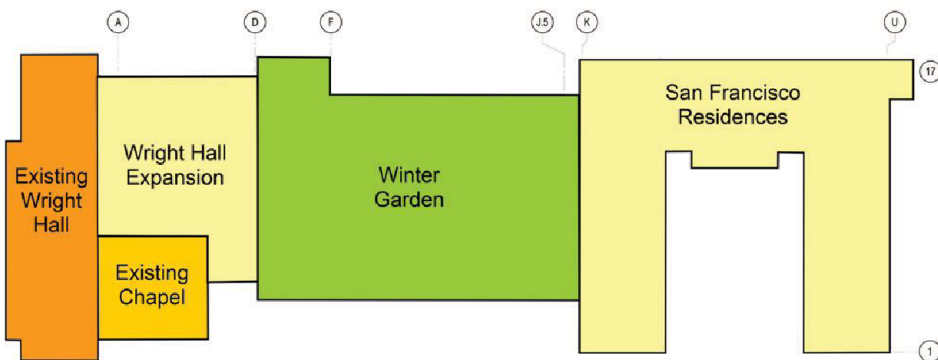
Hedrich Blessing



Hedrich Blessing

tolerances the architect also required a strict ovality and distortion tolerance since the trusses would be exposed to view. (For more on the bending-rolling process, see “There’s More than One Way to Bend a Beam” in the January 2016 issue, available at [www.modernsteel.com](http://www.modernsteel.com).)

The nine trusses are spaced at 16-ft, 3-in. centers, with 8-ft, ½-in. spacing between top chord members, and are supported at each end at the bottom chord. To stabilize the individual trusses, each truss is connected to the adjacent trusses with a grid of HSS3.500x0.258



▲ A layout of the expansion/addition project.

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◀ ▼ Bender-Roller Chicago Metal Rolled Products used a three-roll, pyramid bending process to curve the 36 tons of HSS to various radiuses from 250 ft to 12 ft.



Chicago Metal Rolled Products



Halvorson and Partners

◀ Unreinforced web penetrations were provided in many floor beams to route MEP systems.

▼ The roof trusses are spaced at 16-ft, 3-in. centers.



Hedrich Blessing

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at the top chords. The roof is supported by built-up plate connections cantilevering off the second framing floor of the greenhouse structure. The trusses are each supported by a single pinned connection on the concrete roof of the north section of San Francisco Hall. The staging of this erection had to be carefully managed to ensure each truss would fit into the provided connection points. The design team worked closely with the contractor and fabricator to develop the most visually appealing and cost-effective solution that would allow for the greenhouse glazing system to stay within the project budget. ■

### Owner

Loyola University Chicago

### General Contractor

Power Construction

### Architect

Solomon Cordwell Buenz

### Structural Engineer

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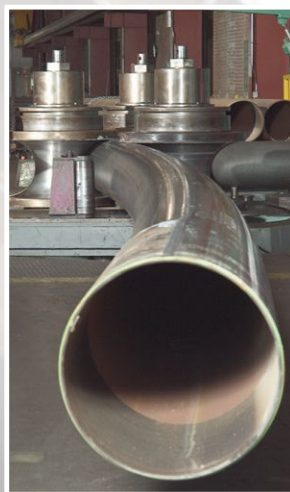
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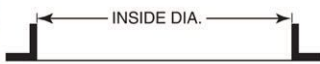




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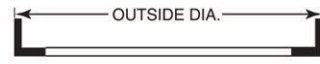
**1 Angle Leg Out**



10" x 10" x 1" Angle



**2 Angle Leg In**



10" x 10" x 1" Angle



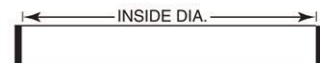
**3 Flat Bar The Hard Way**



24" x 12" Flat



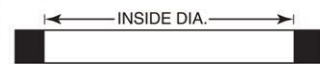
**4 Flat Bar The Easy Way**



36" x 12" Flat



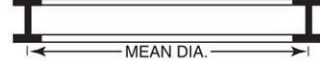
**5 Square Bar**



18" Square



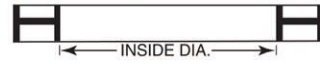
**6 Beam The Easy Way (Y-Y Axis)**



44" x 285#,  
36" x 848#



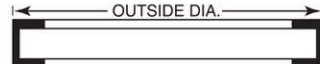
**7 Beam The Hard Way (X-X Axis)**



44" x 285#



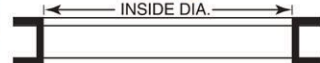
**8 Channel Flanges In**



All Sizes



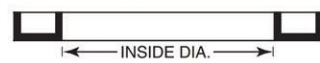
**9 Channel Flanges Out**



All Sizes



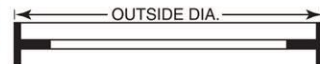
**10 Channel The Hard Way (X-X Axis)**



All Sizes



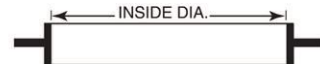
**11 Tee Stem In**



22" x 142<sup>1</sup>/<sub>2</sub># Tee



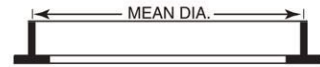
**12 Tee Stem Out**



22" x 142<sup>1</sup>/<sub>2</sub># Tee



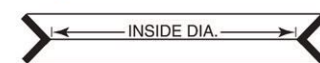
**13 Tee Stem Up**



22" x 142<sup>1</sup>/<sub>2</sub># Tee



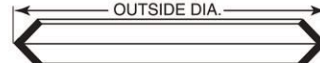
**14 Angle Heel In**



8" x 8" x 1" Angle



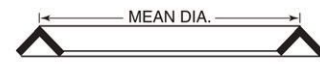
**15 Angle Heel Out**



8" x 8" x 1" Angle



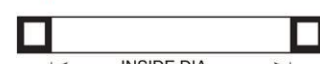
**16 Angle Heel Up**



8" x 8"x1" Angle



**17 Square Tube**



24" x 1<sup>1</sup>/<sub>2</sub>" Tube



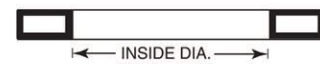
**18 Rectangular Tube The Easy Way (Y-Y Axis)**



20" x 12" x 5/8" Tube



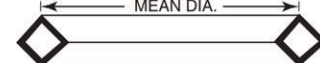
**19 Rectangular Tube The Hard Way (X-X Axis)**



20" x 12" x 5/8" Tube



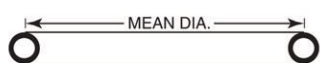
**20 Square Tube Diagonally**



12" x 5/8" Square Tube



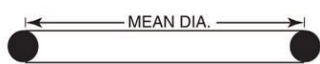
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# Games of STEEL

BY WILL PICKERING

A SteelDay event showcases the construction of steel buildings with a display of ironworker skills.

- ◀ The column-climbing competition.
- ▶ Working on the RealWeld trainer.



**FOR THE PAST SEVEN YEARS,** AISC's annual SteelDay has given the construction industry and the general public a closer look at the wonders of structural steel.

Erector LPR Construction, Inc., decided to go both routes for its first SteelDay event in September 2015.

The sales staff provided tours of our Loveland, Colo., campus, including our large training room, where apprentice classes are held, and the welding laboratory, which houses the RealWeld welding trainer, a computer-assisted welding aid. Visitors also got to visit the training tower, a 22-ton structure used for testing and training applications.

When it came to presentations, three LPR experts held one-hour breakout sessions, highlighting topics such as the importance of AISC's erector Certification program, challenging picks that demonstrate the difficulties of engineering hoisting operations, and the fact that not all safety is created equal—e.g., poorly implemented anchorages for fall protection are the equivalent of no fall protection at all.

But then we decided to take things a step further. Not only did we want to introduce visitors to our facilities and our expertise, we also wanted to show them how we get our hands dirty and give them a taste of what ironworking looks like, live and in person. Thus, we held the Ironworker Games, a series of contests that let our employees—16 in all—demonstrate their prowess in areas such as bolting up, torch cutting, the RealWeld welding test, spud-wrench throwing and column climbing.

Bolting, a staple of apprentice ironworker tasks, requires fast and accurate installation to keep production flowing. For this challenge, all participants had to select the correct bolts and install them quickly for the highest score possible. Attention to detail and preparation led the winner to victory.

Torch cutting is another necessary skill for working with steel. The task was to cut a very specific shape as cleanly and quickly as possible after setting up the oxygen/acetylene torch. Smooth motion and amazingly steady hands helped win the event. (A fellow competitor even noted that the winner's cut was so perfect, it looked as if someone had used a grinder to clean the cuts.)

LPR's RealWeld trainer rates a person based upon parameters set in a welding procedures specification—e.g., work angle,

**Will Pickering** ([wpickering@lprconstruction.com](mailto:wpickering@lprconstruction.com)) is a craft instructor with LPR Construction, Inc., an AISC Member erector and Advanced Certified Steel Erector.





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travel angle, etc. The trainer has an audio coach that directs the welder to correct the positioning of their electrode while welding. Upon completing the weld, the RealWeld rates the welder on several factors. To score a perfect 100, the welder must not have the audio coach correct them even once. For this event each competitor would run three passes, and the best average would win. The winner scored an average of 97.5% for the win, but a close second place saw the company's first individual 100% for one pass while welding with stick.

Spud throwing, though not a practical example of an ironworker's skill, was added purely for entertainment value. For those who don't know, a spud is a wrench with a pointed end used to align structural members. A target, roughly 30 ft away, was made on bales of hay, and the competitors let the wrenches fly. Throwing techniques varied from underhand, similar to throwing horseshoes, to an overhand axe-style throw. The final victor defeated fellow competitors twice in tie-breaking rounds.





▲ Winning the Bronze!

Last but not least was column climbing, a method of accessing upper elevations that has been performed since steel columns have stood upright. Judging for this event was easy: The fastest climb time resulted in first place. The best time saw a first-year apprentice climbing the 20-ft W12×45 column in 5.75 seconds, setting a new LPR record.

Throughout the day, it was good to see family, friends and other visitors show up to support the competitors and get a closer look at our methods and facilities. It may be as close to seeing the daily work of an ironworker as many of them will ever. And in the end, that is what the SteelDay is meant for: helping others understand how our industry works.

For more on SteelDay, taking place September 30, visit [www.steelday.org](http://www.steelday.org). ■



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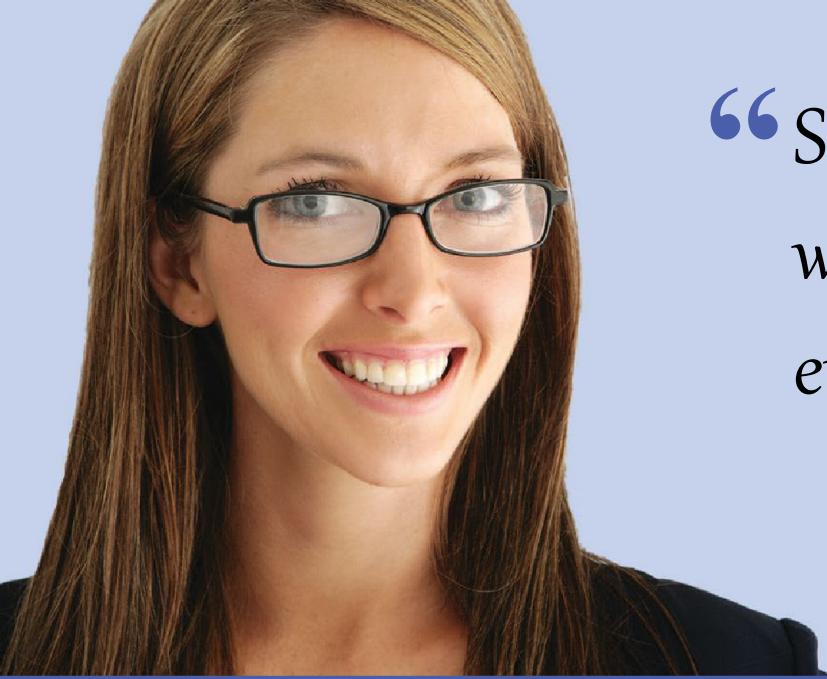
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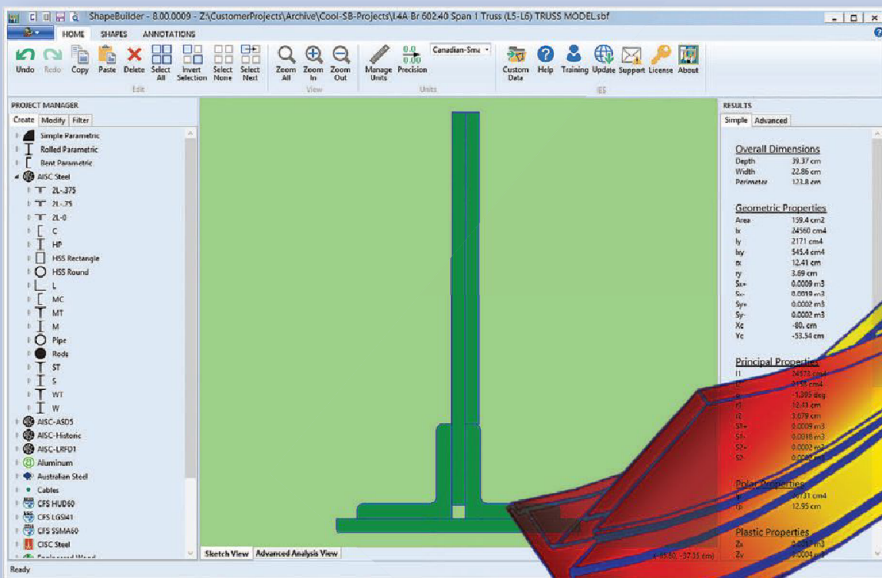


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## conference preview

# WHAT YOUR FABRICATOR WISHES YOU KNEW ABOUT HSS CONNECTIONS

BY KIM OLSON, P.E.

**IT IS A COMMON MISCONCEPTION** that structures using hollow structural sections (HSS) are more expensive than those comprised primarily of open sections.

One reason for this belief is that wide-flange members are usually less expensive than HSS on a per-pound basis. However, in most axially loaded applications, an HSS member will overcome such cost differences because the efficiencies that it brings to the job will more than outweigh any per-pound cost increase. And remember that material cost is only one component of a project's structural cost. Fabrication also contributes to the total cost, and in the case of HSS members it can represent a sizable expense. But most fabrication costs, like the devil, are in the (connection) details. Below are some tips that can help reduce your HSS detailing cost and, subsequently, your HSS cost as a whole.

### Shear Connections

Shear connections represent the majority of connections on a typical job. Wide-flange-beam-to-HSS-column connections may be a single-plate, WT, double-angle or a through-plate shear connection. The first three connections listed have approximately similar costs. A through-plate connection, however, can be up to three times more expensive than a single-plate connection. This is due to the large amount of work required to create aligning slots on opposing faces of the HSS members, permitting a plate to pass through the tube and to weld each wall. In addition, there are constructability considerations in erecting beams between shop-attached through plates, so it is common to field weld the through plates—which further contributes to the cost. In spite of these costs and erection difficul-

ties, in a recent Steel Tube Institute study, fabricators report that through-plate connections are still widely specified by engineers, with many firms using the through-plate connection as their standard detail connection to an HSS member.

With a three-times cost premium, it is more cost-efficient to increase the wall thickness of the HSS by one-eighth or one-quarter of an inch and connect to the face of the HSS, rather than specifying a thinner-walled HSS with a through-plate connection. It is important to note that using ASTM A500 Grade C or ASTM A1085 also increases the efficiency of connections. Because of the increased yield strength and increased wall thickness (for A1085), engineers will achieve greater capacity out of a single shear-plate connection to the face of an HSS column and decrease the need for the costly through-plate connection. Through-plate connections should only be specified if axial loads are transferred through the joint.

### Moment Connections

Standard (non-seismic) moment connections between wide-flange beams and HSS columns can be detailed as a cut-out plate connection, a through-plate connection, a direct complete-joint-penetration (CJP) welded connection or a direct partial-joint-penetration (PJP) weld connection. In the case of the CJP and PJP welded connections, the flanges of the wide-flange beam are welded directly to the face of the HSS column. This often requires a thicker HSS wall than would be necessary for a cut-out plate or through-plate connection. Even taking into account the increased wall thickness, a direct PJP weld is by far the most economical connection. In the STI study, fabricators indicated the direct CJP weld, through-plate connec-

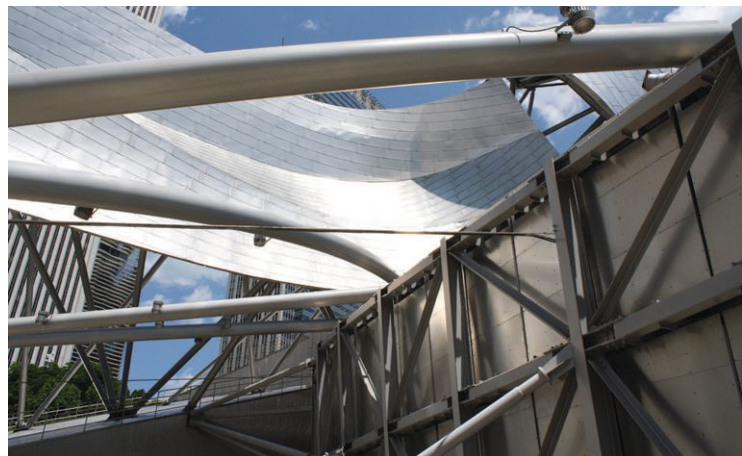


#### Kim Olson

([kim@forseconsulting.com](mailto:kim@forseconsulting.com)) is a structural engineer with Forse Consulting, technical consultant to the Steel Tube Institute.







tions and cut-out plate connections were approximately similar in cost. The STI study, however, did not include inspection costs which can be quite high for a direct CJP weld connection as they are usually incurred by the owner, not the fabricator.

## HSS-to-HSS Connections

HSS are often specified as truss members for their aesthetics and efficient member capacities, and there are several things to consider to achieve an economical truss design.

**Panel points.** The lowest-weight truss does not necessarily equate to least cost of the fabricated truss. Fabrication costs factor heavily into the completed truss cost due to its connections; therefore, selecting a truss profile with the fewest number of panel points will be the most efficient choice, even if that means specifying heavier chord members.

**Matched vs. stepped.** When welding rectangular truss members, the connection can be described as “matched” or “stepped.” A matched connection occurs if the widths of the tubes being connected are equal. For example, connecting an HSS6×6 branch member to an HSS6×6 chord member creates a matched connection. If the branch member is smaller in width than the connecting chord, it is a stepped connection. For example, connecting an HSS4×4 branch member to an HSS6×6 chord member creates a stepped connection. A stepped connection is preferred as it leaves a landing on the flat of the chord member to make an economical fillet weld connection. In a matched connection, especially if the tube and/or corner radius are large, welding may require a steel backing or a backing weld to close the root of the joint. A matched connection using smaller members may not require backing, but may require a flare bevel groove weld. These welds, while fairly economical, are less efficient than fillet welds.

**K-type connections.** This connection type, where two branch members intersect the chord member at the same point,

can be specified to be “gapped” or “overlapped.” A gapped connection, which is less expensive, allows for a gap between the branch members where they intersect the top face of the chord. Thus branch welding can occur independently and only one bevel cut of each branch member is required. The gap also provides a small amount of fit-up tolerance and allows the truss to be tack welded and entirely assembled prior to final welding to ensure correct fit-up. If the branch members overlap partially or fully, a stronger joint is achieved but it comes at a significant increased fabrication complexity and cost. These connections should only be considered when branch loads are so large they require load transfer directly between branches, not just through the chord.

**CJP welds.** CJP welds are generally not required and should be avoided in truss-type connections. In an HSS-to-HSS connection, backing cannot be used for a CJP weld due to the lack of access to the inside of the tube unless the connection occurs at the member end. CJP welds made without backing require special fit-up, special inspection procedures and welder pre-qualification. It is usually possible to develop the required connection strength using fillet or PJP welds.

When designing with HSS, it is good practice to consider connection requirements when sizing HSS members, whether you are designing the connections or delegating the work. By considering HSS connections while sizing members, a designer will find that fillet welds and connections to the face of HSS columns will generally be adequate for typical joints. Specifying the quick answer will always cost the project big bucks in the end. ■

*This article is a preview of Session N91 “What Your Fabricator Wishes You Knew About HSS” at NASCC: The Steel Conference, taking place April 13-15 in Orlando. Learn more about the conference at [www.aisc.org/nascc](http://www.aisc.org/nascc).*



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## conference preview

# SIMPLIFYING TRICKY CONNECTIONS

BY LOGAN CALLELE, P.ENG.

**ANY DISCUSSION OF STEEL CONNECTION DESIGN** is sure to elicit strong opinions and a wide variety of approaches to the design process.

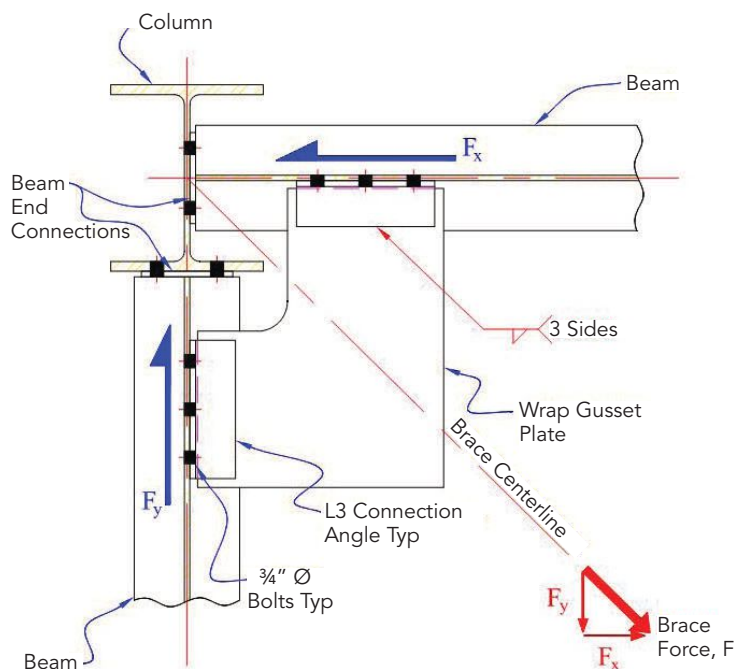
This variance reflects both the wide range of connection geometry and types as well as the lack of codified design procedures that deal with connections as a whole—most codified design guidance deals with the connection components only. Furthermore, dealing with a wide range of load paths, practicalities and load combinations results in countless design approaches.

### Consulting the Map

With all of these possibilities, it's helpful to have a road map for navigating the options, from simple-beam or brace-end connections to complicated vertical bracing connections. The road map's basic approach, illustrated in the following steps, will focus on critical boundaries within the connection that define the type of behavior that the designer wants to see. As with many engineering problems, it starts with what the designer knows and then logically addresses the remaining details until the design is finished.

1. Start with an understanding of the construction type expected—bolted connections, welded connections, or a combination thereof.
2. Assess the connection geometry. Draw in the parts of the connection that you know. For example, in many bracing connections the connection's capacity may be limited by a critical gusset plate mechanism, but the overall gusset geometry is primarily determined by the brace size, angle and end connection. Thus, start the design process by drawing out as much of the connection as possible, which will help establish geometric limits for the connection component calculations completed later.
3. Establish a continuous load path that will provide the connection behavior required, taking into consideration how the external forces are introduced into the connection and how they are transferred along the load path.
4. Decide what boundary within the connection will be critical for establishing an internal force distribution consistent with the desired behavior and load path. For example, take a look at the common wrap-plate connection illustrated in Figure 1. On the boundary between the connecting angle and the beam web it is critical to assume that there is only a shear force (parallel to the long axis of the beam). If a normal force (perpendicular to the

long axis of the beam) at this boundary is assumed, then the beam and the beam-end connection would need to be designed for the lateral shear that this normal force would create.



▲ Figure 1. Wrap-plate connection boundary forces.

**Logan Callele** is the engineering manager for Waiward Steel, LP, in Edmonton, Alberta. He is a member of the Canadian Standards Association Technical Committee on Steel Structures for Buildings and also sits on the Industrial Advisory Board for the CISC Steel Center at the University of Alberta.





## conference preview

5. Using the known external forces and connection geometry, draw the free-body diagram (FBD) of the connection and calculate the moments and forces at the critical boundary in a way that is consistent with the expected behavior and load path. It can be helpful to assess the local stiffness of the connection components to establish the FBD for statically indeterminate connections. In such cases it is usually best to consider a range of possible relative stiffnesses to identify the range of load distributions and see how sensitive the FBD is to the assumed behavior.

6. Apply an assumed force distribution to the boundary that will satisfy statics. Typically, selecting one of the three models presented herein will suffice, but there are many more possible distributions.
7. Follow the assumed loads through the connections and associated members. Assess ductility and make use of the lower bound theorem. Ductility demands and stability concerns are the two primary causes for having to modify the assumed loads. Ductility demands arise from either imposed deformations (beam end rotation or seismic considerations, for example) or load redistribution possibilities when dealing with statically indeterminate connections. Ductility concerns usually are associated with fracture of connection components such as plate or welds. Stability concerns often arise from two dimensional buckling concerns, out-of-plane eccentricities and end restraint assessments.
8. Following the load path and applying the assumed load distribution, the codified connection component checks, such as those found within the AISC *Specification*, can be applied. Some other design checks not covered by codes may still be called for, such as a yield-line analysis for plate flexure or checking the plastic cross-sectional strength of plates for shear and normal stress interaction.

### Common Connection Boundaries

Next, let's take a look at common connection boundaries. Three common boundary force distributions are presented, all of which are easy to implement in hand calculations or simple spreadsheets. More complex models and/or finite element analysis would undoubtedly describe the actual behavior more accurately, but these models are intended for use in the above-mentioned procedure, and as such they must strike a balance between ease of use and degree of conservatism. The models are also structured so that they have clear forces that can be used to follow the assumed load path through the connection.

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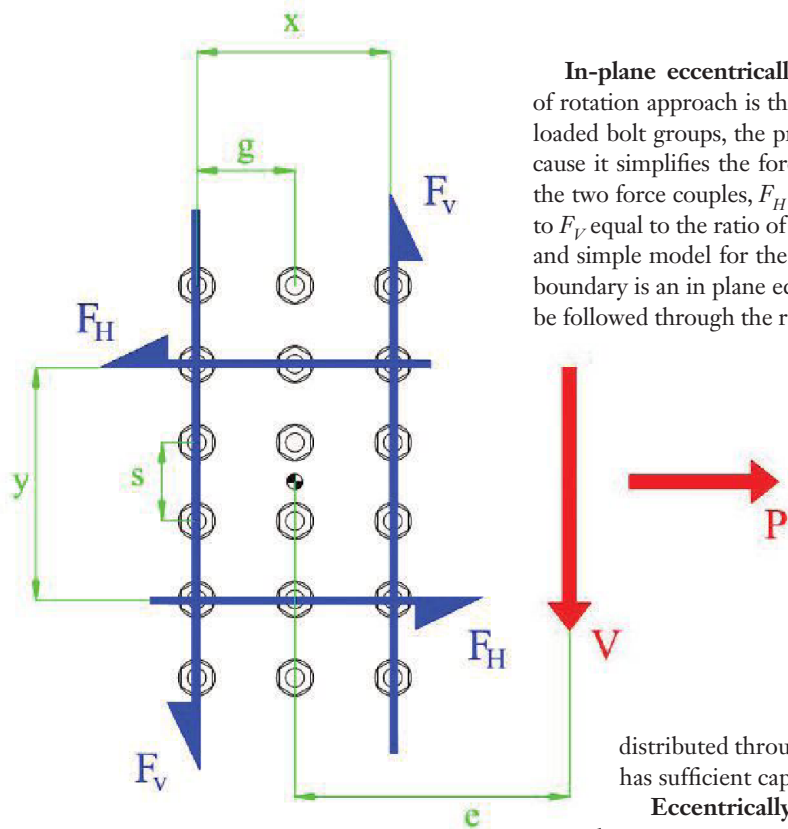


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**In-plane eccentrically loaded bolts.** Though the instantaneous center of rotation approach is the most common method for analyzing eccentrically loaded bolt groups, the proposed distribution shown in Figure 2 is useful because it simplifies the force distribution from a force vector on each bolt to the two force couples,  $F_H$  and  $F_V$ , shown in the figure. Setting the ratio of  $F_H$  to  $F_V$  equal to the ratio of the force couple lever arms,  $y$  to  $x$ , produces a quick and simple model for the forces on the bolt group. If the critical connection boundary is an in plane eccentrically loaded bolt group, these forces can then be followed through the rest of the connection's load path.

**Eccentrically loaded bolts in tension.** If the critical connection boundary is an out of plane eccentrically loaded bolt group, such as that shown in Figure 3 for the welded T-plate, a simple linear distribution can be used to establish the bolt tensile forces (a similar model is also presented in the AISC 14th Edition *Manual* in Figure 7-6). It is possible to establish an explicit equation for the maximum tensile force in the bolts, and the designer can choose to use as many bolts in resisting the eccentric shear as is appropriate to the design scenario. Lastly, the compression force can be

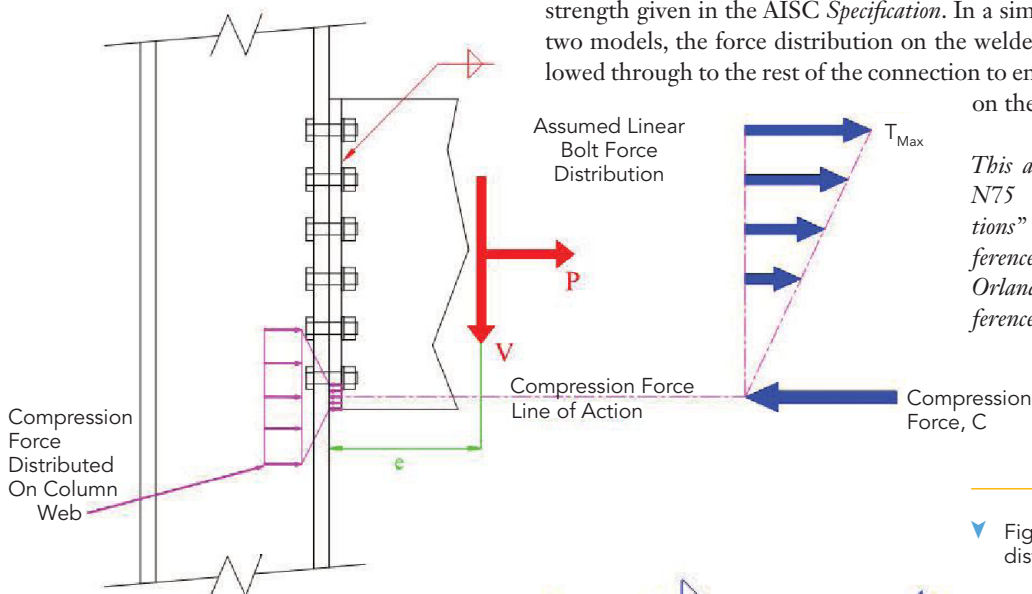
distributed through the connection to ensure the web of the column has sufficient capacity to resist it.

**Eccentrically loaded welded plate boundary.** Welded connection plates are a very common critical connection boundary. Using an elliptical distribution for the transverse shear stress on the fillet weld, the weld capacity can be estimated to be within 3% of that predicted by the instantaneous center of rotation analysis. The maximum transverse shear stress  $\sigma_T$ , and the uniform longitudinal shear stress,  $\tau$ , conform to the fillet weld design strength given in the AISC *Specification*. In a similar manner to the previous two models, the force distribution on the welded boundary can then be followed through to the rest of the connection to ensure all connected elements on the load path are adequate. ■

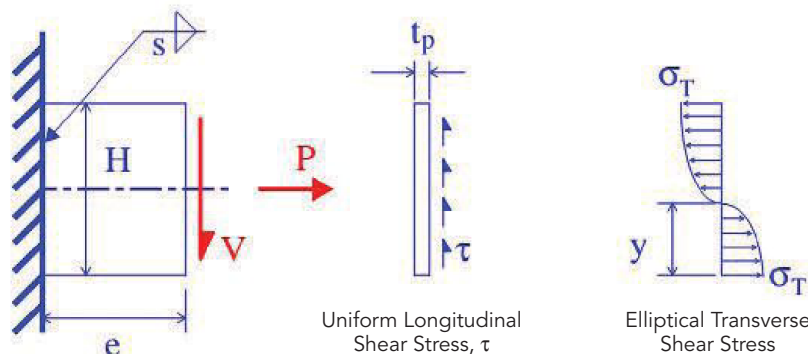
*This article is a preview of Session N75 "Simplifying Tricky Connections" at NASCC: The Steel Conference, taking place April 13-15 in Orlando. Learn more about the conference at [www.aisc.org/nascc](http://www.aisc.org/nascc).*

▲ Figure 2. Boundary force distribution model 1.

▼ Figure 3. Boundary force distribution model 2.



▼ Figure 4. Boundary force distribution model 3.







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A look at some of the issues involved with steel-framed industrial structures and how to overcome them.

## conference preview

# INDUSTRIAL BUILDINGS AND NONBUILDING STRUCTURES: DESIGN CHALLENGES

BY KRUNAL K. PATEL, S.E., P.E., JOHN A. ROLFES, S.E., P.E., JAMES L. RYAN AND WILLIAM N. SCOTT, S.E., P.E.

**INDUSTRIAL BUILDING DESIGN** involves many of the issues faced by designers of more typical commercial buildings.

But they also come with additional challenges. Here, we'll discuss and present ideas to address three of them: steel design for cold operating temperatures; nuances in finite element modeling of industrial structures; and changes slated for the next edition of a design guide for manufacturing facilities with overhead cranes.

### Below Freezing

First is the issue of how framing in steel structures reacts to lower temperatures. Industrial structures or buildings with exposed structural steel, unheated or uninsulated buildings or buildings used for cold storage may be subject to service temperatures lower than the steel's ductile-to-brittle transition temperature for significant amounts of time. Steel that is regularly exposed to temperatures lower than the material ductile-to-brittle temperature and subjected to tension, bending or highly constrained connections may require extra attention regarding design provisions, fabrication details and material selection.

Structural steel in cold-temperature service should be selected with some consideration of fracture resistance and notch toughness. The potential for brittle fracture depends mainly on the following factors:

- Steel strength
- Material thickness
- Loading rate
- Minimum service temperature
- Material toughness
- Type of structure element
- Members or connections with notches, stress risers or constraints from thermal growth

Control of discontinuities is equally important to specifying materials with appropriate toughness. Connection details should be designed to minimize stress raisers such as sharp corners and abrupt changes of stiffness resulting from changes in cross section. Thick or high-strength materials are generally more susceptible to cold cracking in the heat-affected zones of welds and in areas of high residual stresses. In such cases, the choice of appropriate welding procedures is as important as the selection of the material. Material thicker than  $\frac{3}{4}$  in. may be ultrasonic tested for laminations and inclusions.

Materials meeting extreme low-temperature specifications are generally available only from mill orders or heat treating stock available from service centers. The designer should determine availability of steel before specifying material. Generally, shapes produced to ASTM A572 or ASTM A992 can be normalized by heat treatment for low-temperature service, though normalizing



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may double the cost of the steel material and introduce distortions. Heat treatment such as normalizing will also change both the yield and tensile strength of the material, so those properties should be tested after heat treatment to assure they still meet the required levels. Plate produced to ASTM A572 can be produced to -50 °F requirements or may be normalized. The required Charpy V notch test temperature may be specified at 35 °F higher than the lowest anticipated service temperature to account for a difference between expected load rates and CVN test load rates.

Also, welds may contain discontinuities causing stress concentrations, which make welded metal more susceptible to brittle fracture. Thus, it is appropriate to perform welding qualification test to AWS D1.1, Clause 4 to match the toughness requirements of the base material. Connections shown in AISC 360, Appendix 3 for cyclically loaded members are also designed to consider stress concentrations and can be considered for low temperature applications.

### Nuanced Analysis

Next, let's take a look at the role of finite element analysis in the design of steel-framed industrial structures. As finite element analysis and design programs become faster and with greatly expanded design capabilities, the combined structural analysis and design effort is an automated process performed in a very short period of time. While such advances are welcome, some nuances may be missed, leading to either over-conservative design or nonconservative design relative to an optimized design. These nuances include:

- Assuring effective work points in horizontal diaphragms with underside diagonal bracing (in grating floors).
- Providing both adequate lateral restraint and lateral-torsional restraint to columns
- Optimizing unbraced lengths for repetitive floor beams supporting grating.
- Assuring consistency between brace assumptions at roof trusses and the temporary construction condition, along with special consideration to web vertical configurations.
- Other miscellaneous analysis and design aspects—e.g., deck attachment considerations and concrete ponding considerations.
- Assigning boundary conditions (fixed, pinned, etc.) to members in finite element models that accurately match installed conditions.
- Assuring consistency between work points used in finite element models versus actual conditions to apply loads from connection design.
- Keeping sight of the final deliverable (e.g., 2D drawings) while working with a 3D finite element analysis.

### Looking Up

Lastly, concerning top-running cranes, a new resource will soon be available. AIST (Association for Iron and Steel Technology) Technical Report 13: *Guide for the Design and Construction of Mill Buildings* is a recognized reference for the design of mill buildings and heavier-duty manufacturing facilities with top-running cranes. The last edition of this document was issued in 2003 and,

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although still a valuable resource, is not consistent with the current design specifications and building codes. The committee responsible for this document is close to completing a revision to this document that is expected to be published this year. This guide has been enhanced to include and/or address the following items:

- Loading criteria and load combinations are now presented in both ASD and LRFD format and recommendations are provided for load combinations, consistent with the current requirements of the *International Building Code* and ASCE 7, but including crane loadings.
- Design requirements have been revised to be consistent with the requirements of the current steel and concrete design specifications.
- Design requirements have been updated to reflect continued lessons learned relative to the nature of crane loadings and crane runway structures, recognizing the constraints and tolerances associated with steel fabrication and erection.
- Additional commentary is provided to explain the rationale of the recommendations contained in the guide.
- Appendix C of this document has been significantly enhanced to provide more thorough and specific recommendations on inspection requirements and maintenance for these buildings. Due to the heavy use and common abusive nature of the activities within these facilities, the committee recognized this to be a significant topic that is extremely important to the owners of these facilities. ■

*This article is a preview of Session N58 "Industrial Buildings and Nonbuilding Structures: Design Challenges" at NASCC: The Steel Conference, taking place April 13-15 in Orlando. Learn more about the conference at [www.aisc.org/nascc](http://www.aisc.org/nascc).*



- ▲ An update to AIST Technical Report 13, which focuses on overhead cranes, will soon be available.



- ▲ ▼ Industrial structures involve their own set of challenges in addition to the general issues faced by all steel-framed buildings.



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Toll Free: 800.580.3984

[www.armatherm.com](http://www.armatherm.com)

The original bolt-through structural thermal break pad. Stop cold bridging and heat energy losses. Ultimate compressive strength with independently documented compressive creep data. If you design or detail structural connections and have to address LEED compliance issues, visit our booth.

## AT&F

### Booth 734

Cleveland, OH

Ph: 216.252.1500

[www.atfco.com](http://www.atfco.com)

AT&F has provided complex metal cutting, forming and assembly solutions for defense, energy and heavy industrial companies since 1940. We've been fabricating bridge components for over more than 30 years and have invested in assets and quality certifications. Water jet cutting, precision laser cutting, robotic welding equipment enhance our productivity and deliver unique values. Today, we offer press brake formed girders, composite steel structural bridge decks and folded plate girder systems with enhance joining technologies for leading bridge engineers and fabricators.

## Atema, Inc.

### Booth 426

Chicago, IL

Ph: 312.861.3000

[www.atema.com](http://www.atema.com)

Atema, Inc., founded in 2003, is a consulting firm specializing in the quality field. Atema works with state DOTs, transportation authorities, fabricators, erectors and owner agencies to improve the quality in projects and services for structural steel projects. Atema provides business management, consultation and training services for steel fabrication, erection, coatings, nondestructive evaluation and interpretation of codes and specifications. Atema has consulted on long-term projects in Spain, China and Latin America.

## Atlas Tube

### Booth 321

Chicago, IL

Toll Free: 800.733.5683

[www.atlastube.com](http://www.atlastube.com)

Atlas Tube, a division of JMC Steel Group, is the largest privately held pipe and tube manufacturer in North America. Capable of manufacturing a wide variety of hollow structural sections (HSS) and pipe pile products, Atlas Tube offers not only standard HSS but also jumbo-sized and ASTM A1085-compliant sections. Known for flexible operations and advanced production facilities, Atlas Tube proudly manufactures materials at both their Chicago and Harrow, Ontario, locations.

## Autodesk, Ltd.

### Booth 1121

San Rafael, CA

Ph: 781.839.5300

[www.autodesk.com/advancesteel](http://www.autodesk.com/advancesteel)

Built on Autodesk AutoCAD platform, Autodesk Advance Steel provides 3D modeling tools to help you accelerate design and detailing. The latest release includes more powerful integration with Autodesk Revit and Autodesk Navisworks, a redesigned user interface and documentation tools that help save time and reduce rework on shop drawings.



## AVEVA, Inc.

### Booth 1021

Eugene, OR

Ph: 541.485.4719

[www.aveva.com/futureofsteel fabrication](http://www.aveva.com/futureofsteel fabrication)

AVEVA has combined AVEVA Bocad, the most powerful, productive and complete structural steel detailing software, with AVEVA FabTrol, the global market-leading steel fabrication management software. The result is the world's most powerful and integrated end-to-end solution available for the steel fabrication industry. Only such an integrated solution delivers class-leading design capabilities with full control and visibility of an efficient fabrication workflow for the most rapid, profitable and high-quality projects.



## AZZ Galvanizing Services

### Booth 705

Fort Worth, TX

Ph: 817.810.0095

[www.azzgalvanizing.com](http://www.azzgalvanizing.com)

AZZ Galvanizing Services, a division of AZZ, Inc., headquartered in Fort Worth, Texas, owns and operates 42 hot-dip galvanizing plants strategically located across the U.S. and Canada. AZZ operates kettles ranging from 16 ft to 62 ft in length. With the company's network of plants, they are able to accommodate the largest projects with customized turnaround time at a competitive price. "GalvXtra," their unique nickel-zinc alloy process, helps meet the highest quality standards that are necessary in the highly competitive corrosion prevention market.



## BDS VirCon

### Booth 21

Tempe, AZ

Ph: 480.703.2742

[BDSvircon.com](http://BDSvircon.com)

BDS VirCon is a 50-year-old global detailing and building information modeling (BIM) firm with 225 detailers on four continents specializing in large, complex construction projects requiring high technical competency and a large staff of experienced personnel. We have vast BIM and detailing expertise with a demonstrable track record of major projects with leading companies that include project owners, engineers, EPCM firms, general contractors and fabricators in North America, Europe and Australia.

## Behringer Saws, Inc.

### Booth 1815

Morgantown, PA

Ph: 610.286.9777

Toll Free: 888.234.7464

[www.behringsaws.com](http://www.behringsaws.com)

Behringer Saws is a manufacturer of high-performance bandsawing machines, circular cold saws and structural fabricating equipment. With over 85 years in metal saw manufacturing, Behringer has clearly positioned itself as the technological leader in the industry. This, coupled with synergistic manufacturing capabilities, commitment to excellence and a mindset of not taking shortcuts, keeps it on the forefront of quality.



## Beijing Jinzhaobo High Strength Fastener Co., Ltd.

### Booth 28

Beijing, China

Ph: 0086.15130072227

Toll Free: 0086.10.60553140

[www.goodbolts.com](http://www.goodbolts.com)

Beijing Jinzhaobo High Strength Fastener Co., Ltd., is a professional manufacturer of structure bolts, TC bolts, welding studs, etc. that are ISO9001 and CE certified.

## BendTec, Inc.

### Booth 711

Duluth, MN

Ph: 218.722.0205

Toll Free: 800.BENDTEC

[www.bendtec.com](http://www.bendtec.com)

BendTec has been servicing the steel industry for 99 years and designed the first induction bending machine in North America. We are a leader in induction bending and fabrication of tubular members for a variety of structural and architectural applications, fabrications, design and engineering. Fabrication services: engineering (including layout and weld procedure development), hot/cold bending, welding, machining, heat treating, blasting/painting, nondestructive examination. Products: roof/Vierendeel trusses, parabolic/bridge arches, long-radius bends, light/power poles, signs and window mullions.



## Bentley Systems, Inc.

### Booth 811

Exton, PA

Ph: 610.458.5000

Toll Free: 800.BENTLEY

[www.bentley.com](http://www.bentley.com)

Bentley is a global leader dedicated to providing architects, engineers, geospatial professionals, constructors and owner-operators with comprehensive software solutions for sustaining infrastructure. Founded in 1984, Bentley has more than 3,000 colleagues in over 50 countries and more than \$600 million in annual revenues, and since 2006 has invested more than \$1 billion in research, development and acquisitions.

## Birmingham Fastener

### Booth 706

Birmingham, AL

Ph: 205.595.3511

Toll Free: 800.695.3511

[www.bhamfast.com](http://www.bhamfast.com)

Birmingham Fastener, Inc., is a full-line distributor of structural fasteners for the domestic and international markets. We have a manufacturing facility in Birmingham, Ala., that enables us to provide you with non-standard structural bolting and any type of welded assembly, threaded rod, or bent anchor bolt you might need. We currently have branches in: Dallas, Huntsville, Ala., Jacksonville, Fla., and Mobile, Ala.



## Birmingham Rail & Locomotive

### Booth 111

Birmingham, AL

Ph: 205.424.7245

Toll Free: 800.241.2260

[www.birminghamrail.com](http://www.birminghamrail.com)

Birmingham Rail and Locomotive supplies rail and accessories for overhead cranes and railroad applications. All common and many hard-to-find sections are available along with materials required to put rail into service. The locomotive division provides service, repair and rebuilds along with parts for modern and older locomotives.



## exhibitors

### Black Rook/ Reyami Steel Construction and Engineering Booth 8

Chicago, IL  
Ph: 630.306.8246  
[www.blackrookcorp.com](http://www.blackrookcorp.com)  
[www.rsce.com](http://www.rsce.com)

Black Rook-RSCE is a service provider for advanced structural steel detailing solutions and allied engineering services for various and varied types of commercial, industrial, oil and gas and miscellaneous categories of structures worldwide. Using sophisticated 3D modeling and detailing software by our competent and capable team coupled with our R&D and service excellence model, we provide our clients precise and cost effective deliverables for seamless fabrication and erection.

### Blair Corporation Booth 120

Conroe, TX  
Ph: 832.928.9655  
[www.blairwirerope.com](http://www.blairwirerope.com)

Blair Corporation specializes in the fabrication of stainless steel cables for hand rails in cable railing projects. We supply high performance wire ropes, cast and Bridon, as well as aircraft cable, cable clamps and turnbuckles used in safety

### Bluearc Stud Welding Booth 700

Braserton, GA  
Ph: 770.513.2066  
Toll Free: 877.824.7883  
[www.bluearcstudwelding.com](http://www.bluearcstudwelding.com)

Bluearc Stud Welding is one of only a few manufacturers that offer complete stud welding solutions. Bluearc not only provides cutting-edge equipment technology that we design and build ourselves, but we also provide state-of-the-art weld stud fasteners and other innovative stud weld fastening solutions. You can rely on Bluearc Stud Welding to find the best solutions for you regardless of what brand of stud welding equipment you may be using. At Bluearc, we pride ourselves on providing application expertise, exceptional customer service and value-added assembly services to help you meet your most demanding fastening requirements. We were the first domestic manufacturer to introduce digital welding technology for quick, easy stud welding with greater productivity.

### Bluebeam Software, Inc. Booth 826

Pasadena, CA  
Ph: 626.788.4100  
Toll Free: 866.496.2140  
[www.bluebeam.com](http://www.bluebeam.com)

Bluebeam Revu provides powerful PDF solutions that digitize workflows and speed up productivity across departments, including detailing, estimating and production. Create and red-line 2D and 3D PDFs with industry-standard markups, create custom stamps and perform takeoffs with calibrated measurement and count tools. Respond to RFIs, create submittals and complete punchlists faster than ever before. Collaborate in real time from your desktop, tablet PC or iPad using Revu's cloud-based solution, Bluebeam Studio.

### Bradken, Inc. Booth 604

Kansas City, MO  
Ph: 816.270.0724  
[www.bradken.com/our-business/engineered-products/industrialproducts](http://www.bradken.com/our-business/engineered-products/industrialproducts)

Bradken knows the structural market: If you have a structural project that has or may lend itself to steel cast connections (buildings, stadiums, bridges, etc.) we would appreciate the opportunity to discuss it with you and explore the options. Full service steel foundry and machining organization. Carbon, low-alloy and stainless steel castings weighing as much as 55,000 lb, we cover a wide range of materials and configurations. From engineered concept to finished product, Bradken keys in on highly engineered, large, complex, mission-critical steel castings.

[www.aisc.org/nascc](http://www.aisc.org/nascc)



### Bridge Grid Flooring Manufactures Association (BGFMA) Booth 613

North Baltimore, OH  
Ph: 419.257.3561  
Toll Free: 877.257.5499  
[www.bgfma.org](http://www.bgfma.org)

The BGFMA is comprised of companies who manufacture steel grid flooring systems for bridges and other companies with an interest in the steel grid market. The role of the association is to promote the use of grid reinforced concrete and Exodermic bridge decks through data collection, research/development and education.

### Brown Consulting Services, Inc. Booth 508

Houston, TX  
Ph: 281.260.9749  
[www.steelconnectiondesign.com](http://www.steelconnectiondesign.com)

Professional structural engineering firm specializing in connection design calculations and shop drawing supervision for structural steel, steel stairs and miscellaneous steel projects. Licensed in 46 states and the U.S. Virgin Islands, Brown offers additional services including: structural design, forensic engineering, expert witness testimony, light-gauge steel calculations, project pricing and quick turnaround. Contact: [al@steelconnectiondesign.com](mailto:al@steelconnectiondesign.com). Make Brown "Your Engineering Connection."

### Buckner Companies Booth 700

Graham, NC  
Ph: 336.376.8888  
Toll Free: 800.848.6234  
[www.bucknercompanies.com](http://www.bucknercompanies.com)

Since 1947, Buckner has provided quality workmanship, met demanding schedules and completed complex projects in major markets. Boeing's 787 Dreamliner Paint Shop, Kumho Tire, and Bridgestone Tire are recent accomplishments. Buckner is an AISC Advanced Certified Erector ranked in the top 10 by *ENR* for over a decade. Adding to it accomplishments, Buckner has been awarded with three "Projects of the Year" from SEAA and two "Projects of the Year" from SC&RA. Buckner's family of businesses consists of Buckner Steel Erection, Buckner Heavy-Lift Cranes and Buckner Industrial Rigging.

### Bull Moose Tube Company Booth 329

Chesterfield, MO  
Ph: 636.537.2600  
Toll Free: 800.325.4467  
[www.bullmoosetube.com](http://www.bullmoosetube.com)

Manufacturer of hollow structural sections (HSS) from 2 in. square to 12 in. square and corresponding rectangles. Charpy V-Notch HSS available in wall thickness up to 0.625 in. Largest metric HSS producer in North America. HSS available in additional yield strengths of 70, 80, 100 and 110 KSI. HSS available in weathering grade steel.

### Bushwick Metals/AZCO Steel Booth 1226

Bridgeport, CT  
Ph: 203.576.1800  
Toll Free: 800.221.0390  
[www.bushwickmetals.com](http://www.bushwickmetals.com)  
[www.azcosteel.com](http://www.azcosteel.com)

Bushwick Metals and AZCO Steel offer one of the largest inventories and range of carbon steel structural product lines in the United States. Our stock of wide-flange and jumbo beams from 4 in. through 44 in. and 12 lb through 900 lb per ft is unrivaled. Our in-house processing services include: rotary tee splitting and pinpoint straightening, structural section rolling, cambering, plate bending, plate rolling, precision shearing, rebar fabrication and saw cutting. Bushwick also produces floor and roof decking with quick turnaround deliveries. Other in-house capabilities include CAD controlled precision plate cutting with drilling, tapping, milling and countersinking for plates up to 3 in. thick. The combination of our unique inventory, in-house processing capabilities, in-depth industry and processing knowledge, fast turnaround and deliveries by our professional fleet of drivers and trucks makes Bushwick your best choice.



### CADeploy, Inc. Booth 1027

Danville, CA  
Ph: 925.406.4541  
Toll Free: 408.792.7299  
[www.cadeploy.com](http://www.cadeploy.com)

CADeploy is a leading engineering solutions company that offers structural steel estimation, connection design (PE stamping) and detailing solutions with offices spread over three countries (U.S., Taiwan and India) that are tailored to meet client needs and help them to compete in their markets. It specializes in a wide range of commercial, industrial, medical, educational, bridges, miscellaneous (stairs and rails), PEMB structures, static equipment like pressure vessels, storage tanks, LPG bullets, heat exchangers and utility structures like tubular poles, lattice towers, substations and transmission lines. CADeploy's clients leverage the investments CADeploy makes on technology (SDS/2 and Tekla) and professionals (350+) without paying a premium for the services and receive the very best value for their money. An associate Member of AISC, CADeploy is committed to deliver solutions that are of highest quality through well-established systems and procedures.

### CAMBCO, Inc. Booth 1306

Houston, TX  
Ph: 713.781.9702  
[www.cambcoinc.com](http://www.cambcoinc.com)

CAMBCO—The original cambering machine since 1984! Cambco offers eight cambering machine models to fulfill any cambering requirement from small commercial buildings to highway bridges. We offer the complete cambering machine as well as a "Do it Yourself Hydraulics Kit" for each model. Conveyor-fed and powered rollers also available on most models. Contact us for additional information. We are looking forward to hearing from you!

### Canam-Bridges Booth 721

Claremont, NH  
Ph: 708.925.9518  
Toll Free: 800.681.4440  
[www.canambridges.com](http://www.canambridges.com)

For over 50 years, Canam-Bridges has led the North American industry in the design, fabrication and construction of steel bridges, structural bearings and expansion joints for the highway, railway and industrial markets. The company adds real value to the projects it executes thanks to its team of technical experts, state-of-the-art equipment, high production capacity and fully dedicated painting and metallizing facilities.





# exhibitors



## Canam Buildings Booth 909

Point of Rocks, MD  
Ph: 301.874.5141  
Toll Free:  
800.638.4293



**CANAM**  
BUILDINGS

[www.canam-construction.com](http://www.canam-construction.com)

Expert in designing, manufacturing and developing products and solutions for steel construction, Canam encourages collaboration with clients and partners to make building construction a simple and reliable process, meeting deadlines in a timely manner. Steel structures, floors, walls or building envelopes, our solutions are focused, above all, on simplicity for construction sites without surprises.

## Cast Connex Corporation Booth 1006

San Francisco, CA  
Ph: 416.806.3521

[www.castconnex.com](http://www.castconnex.com)

Cast Connex is the supplier of off-the-shelf connection solutions for structural steel, including brace end connectors for use in SCBF (high-strength connectors), sculpted clevis-type connectors and tapers for AESS (universal pin connectors and architectural tapers) and high-ductility yielding connectors for use in the retrofit of seismically deficient structures or as a yielding fuse in any other structural configuration (Scorpion Yielding Connectors). Cast Connex also designs and supplies custom cast steel structural nodes and components for use in building and bridge structures.

## Cerbaco, Ltd. Booth 416

Frenchtown, NJ  
Ph: 908.996.1333

[www.cerbaco.com](http://www.cerbaco.com)

Cerbaco's line of 500+ configurations of non-metallic weld backings permit finished-quality, full-penetration welds from one side. For use with structural steel, shipbuilding, pipeline, pressure vessel and tank manufacturing. Backings work with MIG, TIG, stick electrode, sub arc and flux core welding processes to weld carbon and alloy steel, stainless and aluminum. Where one-sided welding is not desirable, backings eliminate arc gouging or heavy grinding prior to second-side welding.

## Chicago Clamp Company Booth 310

Broadview, IL  
Ph: 708.343.8311

[www.chicagoclampcompany.com](http://www.chicagoclampcompany.com)

Chicago Clamp Company provides an innovative method for framing roof openings and supporting rooftop loads with no welding or drilling. This standardized method for connecting joists and beams allows structural engineers to focus on load distribution rather than attachment apparatus or welding concerns. With up to 4,000 lb of capacity per system, it is ideal for the safe and economical framing and installation of rooftop units, sky lights, exhaust fans and vents.

## Chicago Metal Rolled Products Booth 1028

Chicago, IL  
Ph: 773.523.5757  
Toll Free: 800.798.4504

[www.cmrp.com](http://www.cmrp.com)

Curving of every size of angle, bar, channel, tee and beam up to W44x335# the hard way (x-x axis) on the world's largest beam bender. Tube and pipe bending up to 30 in. OD. Rectangular tubing up to 20 in. x 20 in. Low-deformation, thin-wall bending. 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. Plate rolling up to 2 in. x 12 ft and 1 in. plate x 20 ft wide. High-accuracy straightening of beams and tees.



## Cleveland City Forge Booth 505

Wellington, OH  
Ph: 440.647.5400  
Toll Free: 800.431.4350

[www.clevelandcityforge.com](http://www.clevelandcityforge.com)

Cleveland City Forge is an innovative American manufacturing and engineering company that combines product development with production to produce standard and custom structural steel components from forging to machining and distribution. Our comprehensive portfolio of standard products include: clevises, pins, turnbuckles, turnbuckle assemblies, threaded rods, rod ends, eye nuts, eye bolts, yokes, swage sockets, flange sleeves, heavy hex nuts and recessed nuts and pins.

## Cleveland Punch and Die Co. Booth 1913

Ravenna, OH  
Ph: 330.296.4342  
Toll Free: 800.451.4342

[www.clevelandpunch.com](http://www.clevelandpunch.com)

The Cleveland Punch and Die Company continues to be the "world leader" in manufacturing the best punches, dies and shear blades in the industry. All of our products are proudly manufactured in the U.S. Original equipment manufacturers continue to trust and recommend our products to meet and surpass our customers' expectations for all steel applications. Our customers continue to trust and rely on our most experienced and friendly engineering and customer service support team in the industry. We are convinced that the tradition and reliability we have built in manufacturing punches, dies and shear blades will lead to future growth opportunities for the next 136 years.

## CloudCalc, Inc. Booth 208

Houston, TX  
Ph: 713.623.1263

[www.cloudcalc.com](http://www.cloudcalc.com)

CloudCalc, Inc., is delivering structural engineering software over the Cloud. Analyze steel structures against the requirements of the AISC Code while taking advantage of the device independence, mobility, collaboration, licensing flexibility, IT cost savings and timelier updates that only the Cloud can bring. Visit our website to learn how you can use CloudCalc to save time and money on your structural analyses.

## Combilift USA Booth 2112

Greensboro, NC  
Ph: 336.378.8884  
Toll Free: 877.266.2456

[www.combilift.com](http://www.combilift.com)

Specialist forklift and straddle carrier manufacturer Combilift produces a wide range of customized handling solutions, all of which are designed for the safe, space-saving and very productive handling of the long and bulky loads like those handled in the steel industry. Four-way Combilifts work as counterbalance, sideloader and narrow-aisle forklifts. The Combi-SC (Straddle Carrier) is the cost-effective solution for the handling of containers and oversized loads. Capacity from 3,200 lb to 180,000 lb.

## COMEQ, Inc. Booth 2024

White Marsh, MD  
Ph: 410.933.8500

[www.comeq.com](http://www.comeq.com)

Exclusive U.S. distributor for quality fabricating machinery including Geka hydraulic single-cylinder and dual-cylinder ironworkers, automated ironworkers and automated punching systems. Allow us to demonstrate how Geka can save you money by decreasing your layout time and labor costs while increasing your accuracy. Also available are Parmigiani angle and plate bending rolls, Safan electric press brakes, Primeline hydraulic forming centers, Euromac CNC punching machines and more.

## ComSlab Booth 311

Concord, ON, Canada  
Ph: 855.787.1980

[www.comslab-usa.com](http://www.comslab-usa.com)

ComSlab is a long-span and shallow composite floor system that helps structural steel compete with the low floor-to-floor concrete designs. ComSlab is a lightweight assembly that has UL-listed exposed and unrestrained ratings of 1, 1½ and 2 hours for spans of 30+ ft! It's ideal for all elevated floor construction such as hotels, schools, office, high-rise multi-residential and medical buildings.

## Connect-EZ/Tincher's Welding Booth 22

Harveysburg, OH  
Ph: 937.903.7836

[www.theconnect-ez.com](http://www.theconnect-ez.com)

The Connect-EZ product line of engineered connection devices eliminates field welding! Designed to meet the strictest code requirements, architects and engineers have specified Connect-EZ with confidence. The simplicity of the devices reduces design time, eliminates the uncertainties of field welding of critical connections and assures easy, reliable visual inspections. Fabricated to the highest-quality standards, Connect-EZ products have proven to provide contractors economies in equipment and labor while offering engineers peace of mind and reduced liability.

## Construction News and Report Publishing, Inc. Booth 122

St. Catharines, ON  
Canada  
Ph: 905.228.1151

[www.chicagoconstructionnews.com](http://www.chicagoconstructionnews.com)

[www.nccconstructionnews.com](http://www.nccconstructionnews.com)

Publisher of regional provincial and national newspapers and magazines targeted to the construction industry.

## Controlled Automation, Inc. Booth 1523

Bryant, AR  
Ph: 501.557.5109

[www.controlledautomation.com](http://www.controlledautomation.com)

Controlled Automation is a customer-driven company specializing in the design and manufacture of superior fabricating equipment. Our mission, as a team, is to strengthen and grow through the success of our customers while offering them constant respect, gratitude and a quality product. Along with new machinery, we offer material handling systems to complement each of our machines. All machines, software, and controls are designed, manufactured, and supported entirely in the United States.

## ConXtech, Inc. Booth 400

Pleasanton, CA  
Ph: 510.264.9111

[www.conxtech.com](http://www.conxtech.com)

ConXtech offers ConX, a "chassis-based modular" structural steel system for rapid delivery of pipe rack, data center, high-density residential, healthcare and commercial structures. With ConX connections, beams are simply lowered and locked onto columns, resulting in safer, faster assembly. The modular ConX System, with standardized processes and advanced manufacturing, produces structures with unprecedented efficiency, precision and quality. The ConX System is AISC codified, OSHPD approved and has delivered over 10 million sq. ft of structure to date.





"Zinc Protects Steel"®

WWW.HOTDIPGALVANIZING.COM



**Even the laziest SLOTH loves his V&S Galvanizing!**

No easier way to get out of a difficult paint spec than to use Hot Dip Galvanizing. Economical, sustainable, and worry free for the life of most structures. Don't be a SLOTH, but don't ask for more work than needed. On your next project bring V&S in and let us consult with the Architect if the steel would be better off Hot Dip Galvanized!

*Come visit our "Sloths" at NASCC in Booth #1211*

V&S Amboy Galvanizing LLC  
Perth Amboy, New Jersey

V&S Detroit Galvanizing LLC  
Detroit, Michigan

V&S Memphis Galvanizing LLC  
Millington, Tennessee

V&S Columbus Galvanizing LLC  
Columbus, Ohio

V&S Lebanon Galvanizing LLC  
Jonestown, Pennsylvania

V&S Taunton Galvanizing LLC  
Taunton, Massachusetts

V&S Delaware Galvanizing LLC  
New Castle, Delaware



"Zinc Protects Steel"®

**800-801-3648**



# exhibitors



## Core Brace, LLC

**Booth 806**

West Jordan, UT

**Ph:** 801.280.0701

**www.corebrace.com**

CoreBrace buckling-restrained braces (BRBs) are a cost-effective solution to improve the seismic performance of structures. This highly ductile system has been used in hundreds of projects for earthquake risk mitigation. CoreBrace's expert staff works closely with owners, architects, engineers, fabricators and erectors to meet their design and construction requirements and is committed to providing braces to the highest level of quality. CoreBrace BRBs are designed and fabricated at their facility in West Jordan, Utah.

## CS Unitec

**Booth 201**

Norwalk, CT

**Ph:** 203.853.9522

**Toll Free:** 800.700.5919

**www.csunitec.com**

Manufacturer of electric, hydraulic and pneumatic power tools including metal working tools for construction and industrial applications. Metal working tools include portable magnetic drills, annular cutters, portable saws, nibblers, nut runners, corner drills, drive motors and tube expansion motors. Extensive line of surface finishing and fabrication tools for grinding, sanding, polishing, beveling and deburring stainless steel, steel, aluminum and other non-ferrous metals. Ideal for finishing flat sheets and round and square tubing.

## D-MAC SAME DAY Steel Deck

**Booth 534**

Alpharetta, GA

**Ph:** 770.664.7120

**Toll Free:** 800.878.3622

**www.samedaysteeldeck.com**

D-MAC SAME DAY Steel Deck specializes in solving your steel deck emergencies with same-day shipment of steel deck and accessories fabricated to your specifications. With over 500,000 sq. ft of steel deck available at our 13 locations, D-MAC has been helping fabricators and erectors avoid costly jobsite delays for over 25 years!

## D.S. Brown Company

**Booth 616**

North Baltimore, OH

**Ph:** 419.257.3561

**Toll Free:** 800.848.1730

**www.dsbrown.com**

The D.S. Brown Company is a manufacturer of bridge and highway construction products and is based in North Baltimore, OH. D.S. Brown offers: Steelflex Modular, Strip Seal and Delcrete Expansion Joint Systems, HLMR Pot and Disc, Elastomeric and Seismic Isolation Bearing Assemblies, Delastic Preformed Neoprene Compression Seals, Delpatch Elastomeric Concrete and a number of specialty products such as our Deckguard waterproofing membrane to the bridge and pavement markets.

## DACS, Inc.

**Booth 306**

Portsmouth, VA

**Ph:** 757.393.0704

**www.dacsinc.com**

DACS, Inc., with a plant strategically located in Portsmouth, Va., manufactures roof and floor decking. Since 1987 DACS has been providing the steel deck industry with affordable products and quality services. Our continued growth is fueled by loyal customers, innovative products, and expanding markets. With a full line of roof products, including deep decks and cellular decks, as well as composite and non-composite floor decks, DACS is sure to satisfy all your decking needs.

## Daito U.S.A., Inc.

**Booth 1722**

Elk Grove Village, IL

**Ph:** 847.437.6788

**Fax:** 847.437.6789

**www.daitousa.com**

Daito is focused on metal cutting, drilling and plasma cutting 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 toward customer satisfaction by supporting our customers with our knowledgeable and responsive sales, applications and our sales personnel.

## Danny's Construction Company, LLC

**Booth 631**

Shakopee, MN

**Ph:** 952.445.4143

**Toll Free:** 877.451.9627

**www.dannysconstruction.com**

AISC Certified Advanced Structural Steel Erector specializing in fast-track, complex projects. Bridges, stadiums, arenas, retrofit, commercial and industrial.



## Davi, Inc.

**Booth 1923**

Dallas, TX

**Ph:** 972.661.0288

**Toll Free:** 888.282.3284

**www.davi.com**

More than ever, applied technology is being called upon to solve manufacturing's quest for global competitiveness. The challenge is to locate the best technology and to gather them in one place for consultation. DAVI, unique in plate roll and angle roll industry, makes this available at our own U.S. customer support center, located in Dallas, Texas.

## DEICON

**Booth 414**

Dayton, OH

**Ph:** 937.885.4134

**www.deicon.com**

DEICON specializes in vibration control as well as advanced feedback controls. DEICON provides the most effective passive and active vibration control solutions including, but not limited to, tuned mass dampers, damping posts and vibration isolation systems, customized to meet our clients' needs. DEICON's solutions are based on engineering and scientific principles, shaped by years of experience and optimized according to our customers' budgetary and time constraints.

## Delta Structural Steel Services Group

**Booth 1205**

Idaho Falls, ID

**Ph:** 208.528.6110

**www.degroupp.com**

Delta Structural Steel Services Group has been providing the highest-quality steel detailing available for 20+ years. Delta performs all its work in the United States using licensed copies of SDS/2 and Tekla. Delta strives to form a partnership with all its clients, to achieve accurate, on time and on budget results. No matter the size of the project, let Delta be a part of your successful team.



## Descon Plus, Ltd.

**Booth 320**

Naperville, IL

**Ph:** 312.278.4420

**www.desconplus.com**

Descon provides structural steel connection design software. With our new Version 8, we've taken 30 years of user input and applied it directly to the development of our software, and that's not going to change. Whether you work with structural connections all the time or just once in a while, Descon offers great tools for each stage of the connection design process. With Descon, you can produce a working connection in just a few clicks.

## Design Data

**Booth 801**

Lincoln, NE

**Ph:** 402.441.4000

**Toll Free:** 800.443.0782

**www.sds2.com**

Design Data's SDS/2 software solutions are a unique, discipline-driven family of software products that provide the construction industry with a more intelligent way to increase both productivity and profits. SDS/2 software produces smarter models and diverse solutions that empower users to analyze structures, design connections and detail steel to create construction drawings.

## DGS Technical Services, Inc.

**Booth 625**

Elgin, IL

**Ph:** 630.539.8200

**www.dgstts.com**

DGSTS, Inc., has become a well-known steel detailing company among the fabrication industry and is emerging as one of the leading design and detailing companies in the U.S. and Canadian markets. Currently, we have 450+ detailers, professional engineers and several project management teams along with a separate team for quality assurance headed by a P.Eng. Our services extended to design services besides steel detailing using SDS/2, Tekla and AutoCAD. Working with large fabricators like Cives, Schuff Steel, Steelfab, CMC, Prospect Steel, etc., has helped us in implementing the best industry standards and processes in the detailing industry, which in itself is a testimonial for our commitment on quality and delivery. This year our presence is bigger at NASCC, with our management team and detailing experts present at the show.

## DiIubal Software, Inc.

**Booth 307**

Philadelphia, PA

**Ph:** 267.702.2815

**www.dilubal.com**

DiIubal offers powerful programs for structural and dynamic analysis for multiple materials including steel, concrete and timber per the American standards. With RFEM, DiIubal has created a non-linear FEA program for analyzing member, plate, wall, shell and solid elements. RFEM is one of the most highly sophisticated yet user-friendly programs especially suitable for new users with its intuitive modeling workflow. See why more than 5,000 engineering offices, construction companies, and universities across the world trust in DiIubal Software.

## DOT Quality Services

**Booth 723**

Chicago, IL

**Ph:** 312.285.5344

**www.dotqs.com**

DOT Quality Services (DOTQS) develops standards of performance, grants quality system certifications and creates and conducts supplier audit programs. Services include testing, analysis and evaluation of knowledge, skills and abilities in bridge and building construction and structural steel fabrication and erection. DOTQS is accredited by American National Standards Institute (ANSI) and by ANAB (ANSI-ASQ National Accreditation Board) as a certification body to grant certification to qualified firms who meet requirements.



## exhibitors

### Eastern Pneumatics and Hydraulics, Inc./ McCann Equipment, Ltd.

**Booth 712**  
Salem, NH  
Ph: 603.893.7662  
Toll Free: 800.356.5624  
[www.ephtools.com](http://www.ephtools.com)

EPH specializes in steel erector and torque tools such as: Tonne electric; TorqFusion pneumatic, electric and battery; Torcup SPX Power Team hydraulic wrenches, cylinders and pumps; Skidmore-Wilhelm bolt tension calibrator; Kabo torque wrenches and torque testers; and Klein drift pins up to 1 1/2 in., structural wrenches and accessories. We operate an ISO 17025:2005 accredited calibration facility for repair, calibration and certification with NIST traceability. We also have the capability to service virtually any make and model torque tool.

### eCADsystems, Inc.

**Booth 625**  
Elgin, IL  
Ph: 630.539.8200 x8204  
[www.dgsts.com](http://www.dgsts.com)

eCADsystems Inc., IL is a division of DGSTS, Inc., and has become a well-known steel detailing company among the fabrication industry and is emerging as one of the leading detailing companies in the U.S. and Canadian markets. Currently we have 450+ detailers, professional engineers and several project management teams along with a separate team for quality assurance headed by a P.Eng. Our services extended to steel detailing using SDS/2, Tekla and AutoCAD. Working with large fabricators like Cives, Schuff Steel, Steelfab, CMC, Prospect Steel, etc., has helped us in implementing the best industry standards and processes in the detailing industry, which in itself is a testimonial for our commitment on quality and delivery. This year our presence is bigger at NASCC, with our management team and detailing experts present at the show.

### Engineering Ministries International Booth 6

Colorado Springs, CO  
Ph: 812.343.3108  
[www.emiusa.org](http://www.emiusa.org)

Engineering Ministries International (eMI) is an organization of engineers and architects who offer a technical design service to Christian Missionaries serving the poorest of the poor in third-world countries. The volunteers pay their own trip expenses, don't charge for their design services and come along side a missionary who wants to build something that is complicated enough to require professional expertise. The services are offered on short-term mission trips.

### Ercolina – CML USA, Inc.

**Booth 1734**  
Davenport, IA  
Ph: 563.391.7700  
<http://ercolina-usa.com>

Ercolina – CML USA, Inc. is the North American supplier of Ercolina tube, pipe and profile bending and metalworking machinery. We are pleased to inventory the highest quality tube bending machines and tooling for round or square tube. For your convenience and support, our products are marketed through a network of local distributors and representatives. Our trained sales staff is backed by over forty years of experience in tube, pipe and profile bending applications.

### ESAB Welding and Cutting Products

**Booth 421**  
Florence, SC  
Ph: 843.669.4411  
Toll Free: 800.ESAB.123  
[www.esabna.com](http://www.esabna.com)

ESAB Welding and Cutting Products serves the structural steel industry with advanced welding and cutting solutions, including customized solutions for its customers and a complete range of seismic certified filler metals tested to meet the most stringent requirements for demand critical welds. To ensure customer satisfaction, many ESAB products carry a 100% satisfaction guarantee.

[www.aisc.org/nascc](http://www.aisc.org/nascc)

### Esskay Design and Structures Pvt., Ltd.

**Booth 2007**  
Vienna, VA  
Ph: 408.625.7256  
Ph: 703.310.6270  
[www.esskaystructures.com](http://www.esskaystructures.com)

We are one of the leading structural steel detailing services company with over 100 engineers. We are an AISC associate member and are capable of detailing both commercial and industrial structures and catering to the following sectors: oil and gas, sports, paint booths, power plants, etc. We use Trimble Tekla Structures for our detailing services and have 56 licenses. This year we have successfully completed the 16,500 tons "Miami Dolphins Stadium Renovations" project, a very complex roof structure.

### Euroboor USA, Inc.

**Booth 314**  
Birmingham, AL  
Toll Free: 844.266.8527  
[www.euroboor.com](http://www.euroboor.com)

Euroboor is a manufacturer of magnetic drills, HSS and carbide tipped annular cutters as well as various other steel fabrication equipment.

### Exact Detailing

**Booth 437**  
Surrey, BC, Canada  
Ph: 250.590.5244  
[www.exactdetailing.com](http://www.exactdetailing.com)

Exact Detailing, Ltd., with three locations in British Columbia Canada, provides a variety of timely, accurate and affordable steel detailing services in either metric or imperial measures. Our end products are fully AISC and CISC compliant. Other services include consultation, project management/coordination and data management services—and through a strategic partnership, we also offer a state-of-the-art surveying service.

### Fabreeka International, Inc.

**Booth 710**  
Stoughton, MA  
Ph: 781.341.3655  
Toll Free: 800.322.7352  
[www.fabreeka.com](http://www.fabreeka.com)

Fabreeka provides vibration isolation solutions including structural bearing pads and expansion bearings for bridges and buildings and thermal insulation material (TIM), a load-bearing thermal break that prevents heat and cold bridging while maintaining structural integrity. 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. Capabilities include NASTRAN and finite element analysis.

### FabSuite – Steel Management Software

**Booths 815 // 915 // 1200**  
Williamsburg, VA  
Ph: 757.645.0842  
[www.fabsuite.com](http://www.fabsuite.com)

FabSuite is a comprehensive set of software modules working together seamlessly to enhance your productivity and increase your profitability. FabSuite offers industry standard functionality along with cutting edge capabilities such as our Remote Link and Inspection Module features. Plus, we back it up with a dedicated team comprised of industry experts with real industry experience. FabSuite sets the standard for steel fabrication management software. Visit us and find out why our clients are the most loyal in the industry.



### Fein Power Tools, Inc.

**Booth 106**  
Pittsburgh, PA  
Ph: 412.922.8886  
Toll Free: 800.441.9878  
[www.feinus.com](http://www.feinus.com)

C. & E. FEIN GmbH invented the world's first power tool—the electric hand drill—in 1895. Today FEIN is a power tool manufacturer with an international reputation. FEIN develops and produces application solutions for the metalworking, interior construction, and automotive sectors for industry and trades. FEIN products are distributed worldwide through 19 international subsidiaries and more than 50 agents. For over 140 years, the FEIN brand has stood for application solutions and premium quality.

### FHS – Overhead Cranes, Hoists and Material Handling Systems

**Booth 309**  
Bartow, FL  
Ph: 863.534.1212  
Toll Free: 800.664.3380  
[www.fhsinc.com](http://www.fhsinc.com)

Design, build, install and service of overhead cranes, hoists, storage rack, fall arrest and conveyor systems. 24/7/365 service, in-house engineering, large inventory of chain and wire ropes hoists and associated parts. Strong association with steel distribution, steel fabrication, power, chemical and manufacturing industries.

### Ficep Corporation

**Booth 1323**  
Forest Hill, MD  
Ph: 410.588.5800  
[www.ficepcorp.com](http://www.ficepcorp.com)



Ficep Corporation is currently the largest manufacturer of structural steel and plate fabrication systems and software. Ficep offers over 100 different CNC systems to achieve the optimum solution to any specific fabricator's application. In addition to the different CNC work centers, Ficep totally integrates custom designed material handling systems for "intelligent steel fabrication" without the requirement for multiple operator involvement.

### Freedom Tools, LLC

**Booth 838**  
Mesa, AZ  
Ph: 480.250.5266  
[www.freedomtoolsllc.net](http://www.freedomtoolsllc.net)

Isn't it amazing how people react to something different? Things people use to say about Thomas Edison or Alexander Graham Bell, but in the end they became amazing inventors. Freedom Tools, LLC, based in Mesa, Ariz., has such an invention, the E-Z Beam Release. This tool is a different concept in setting steel "I" beams. Not only will it save hundreds of man hours per job site, but also the safety factor alone will be an outstanding asset to any company.

### Future Fabricating

**Booth 1026**  
Warren, MI  
Ph: 586.755.7080  
[www.futurefabricating.com](http://www.futurefabricating.com)

Decorative and ornamental metals is the specialization and focus of Future Fabricating. We provide the ornamental features typical of today's signature bridges and buildings. Railings, lighting, decorative details, arches, fencing, signage and landscape details fabricated from ferrous and non-ferrous materials by dedicated craftsmen who are supported by the latest in technology used by our in house designers, engineers and detailers. Future Fabricating: the best choice available for the decorative metals required for your project.

### G.W.Y., Inc.

**Booth 1109**  
Greenfield, NH  
Ph: 603.547.3800  
Toll Free: 888.838.6500  
[www.gwyinc.com](http://www.gwyinc.com)



GWY, Inc., a woman-owned small business, is a global leader in solutions for bolt installation. Our TN tools make turn-of-nut and DTI installations simpler than ever. In addition to TC Shear wrenches we offer electric torque tools up to 7,400 ft-lb and torque multipliers, both available with digital output—perfect where QC, reporting and precision are important. We also specialize in tools for custom applications. We offer sales, rental, repair, calibration and consulting services.



# exhibitors



## Gantrex, Inc.

**Booth 200**  
Pittsburgh, PA  
**Ph:** 412.655.1400  
**Toll Free:** 800.242.6873  
[www.gantrex.com](http://www.gantrex.com)

Gantrex, Inc., is the North American office of the worldwide Gantrex Group. We provide solutions to crane runway problems by producing products including crane rail, rail clips, rail pad, crane girder tiebacks and hydraulic bumpers. The Gantrex Soft Mount Solution is the leading rail and runway fastening system in the world. Come by our booth and see the new RailLok engineered, adjustable rail clip.

## GERB Vibration Control Systems

**Booth 532**  
Lisle, IL  
**Ph:** 630.724.1660  
**Toll Free:** 888.454.GERB  
[www.gerb.com](http://www.gerb.com)



With a company history of over 100 years, GERB is dedicated to vibration and seismic control of buildings, tall structures, rail trackbeds and large machinery (e.g., steam turbines, metal-forming presses, etc.). GERB tuned mass dampers (TMDs) in particular are used worldwide for the vibration control of pedestrian and wind induced vibration of long-span and slender structures (e.g., open floors, bridges, skyscrapers, etc.). GERB systems are based on well established physical principals and the Viscodamper, a viscous fluid dashpot/damper that is frictionless and can work at very low amplitudes and frequencies in all degrees of freedom.

**Gerdau**  
**Booth 413**  
Tampa, FL  
**Toll Free:** 800.237.0230  
[www.gerdau.com/northamerica](http://www.gerdau.com/northamerica)



Gerdau is the leading producer of long steel in the Americas and is one of the largest recyclers around the world, transforming millions of tons of scrap metal into steel products every year. In North America, the annual manufacturing capacity is over 10 million tons of finished steel products. Gerdau employs 12,000 people in 29 states and two Canadian provinces at over 125 North American locations. Globally, the company has more than 45,000 employees and industrial operations in 14 countries with operations in the Americas, Europe and Asia, which together represent an installed capacity of more than 25 million metric tons of steel per year.

## Girder-Slab Technologies, LLC

**Booth 427**  
Cherry Hill, NJ  
**Ph:** 856.424.7880  
**Toll Free:** 888.478.1100  
[www.girder-slab.com](http://www.girder-slab.com)



Utilizing proven materials that have long been used by the construction industry, the Girder-Slab system is designed by the owner's architect and structural engineer, and is available competitively from the builder's customary steel fabricators. The D-Beam girder is manufactured by local steel fabricators as part of a complete structural steel package. The low floor-to-floor height system greatly improves construction operations and the ability to meet critical deadlines, even in cold weather, for mid- and high-rise residential structures.

## Graitec

**Booth 1215**  
Los Angeles, CA  
**Toll Free:** 800.724.5678  
[www.graitec.com/us](http://www.graitec.com/us)

For more than 25 years, Graitec has provided high performance CAD and engineering software for structural building construction with a continued commitment to exceed the industry's creative design and quality. Our innovative BIM technology automatically and dramatically increases user productivity thanks to automation, embedded design and control procedures. Through its capacity of exchanging smart data, our Structural BIM Solution also highly facilitates collaboration between construction design, engineering and building professionals for faster, smarter and more effective communication.

## Grating Fasteners, LLC

**Booth 116**  
New Orleans, LA  
**Ph:** 504.361.3471  
**Toll Free:** 800.227.9013  
[www.gclips.com](http://www.gclips.com)

Grating Fasteners, LLC, specializes in producing the G-Clip line of grating fasteners. G-Clips are used to attach grating materials to structural members using simple hand tools. The entire G-Clip line of fasteners are noted industry-wide as being a cost-effective, fast and dependable way to fasten grating.

## Gravotech, Inc.

**Booth 2**  
Duluth, GA  
**Ph:** 770.623.0331  
**Toll Free:** 800.843.7637  
[www.gravotech.us](http://www.gravotech.us)

The Gravotech Group represents a worldwide network present in 30 countries with more than 900 employees working around the clock to provide customers with exceptional permanent marking solutions. As a global leader in durable marking technologies such as engraving, laser, micro-percussion and scribing, we utilize our expertise to develop and market equipment, software and consumables for every application, from personalization to architectural signage and industrial part marking.

## Greenbrook Engineering Services

**Booth 211**  
Middlesex, NJ  
**Ph:** 732.412.8000  
**Toll Free:** 866.860.8113  
[www.greenbrookengineering.com](http://www.greenbrookengineering.com)

Greenbrook Engineering specializes in steel detailing, 3D modeling, connection design and BIM coordination services for the structural steel construction industry. With offices in New Jersey and California and a production center in Bangalore, India, we serve the design engineering companies, steel fabricators and architects. We have in-house engineering capabilities to design connections and sign and seal them.

## Harsco Industrial IKG

**Booth 18**  
Channelview, TX  
**Toll Free:** 800.324.8417  
[www.harscoikg.com](http://www.harscoikg.com)

Harsco Industrial IKG is one of the world's leading manufacturers of high-quality steel and aluminum bar grating with manufacturing plants throughout the United States, Mexico and China. Our skilled network of sales personnel and engineering staff is the most knowledgeable in the industry, providing consultative services and solutions to customers in a wide range of industries. Harsco Industrial IKG carries on the pioneering spirit of its founders bringing experience, quality, long-term value-added solutions and time-tested reliability to our customers today.

## Haydon Bolts, Inc.

**Booth 804**  
Philadelphia, PA  
**Ph:** 215.537.8700  
[www.haydonbolts.com](http://www.haydonbolts.com)

Haydon Bolts, Inc., is a 152-year-old leading manufacturing and distributor of all kinds of structural bolts and electric tools to the heavy steel and concrete construction industries. Haydon also manufactures large-diameter (5/8 in. to 2 1/2 in.) hot-forged headed bolts of all grades as well as bent anchor rods and plate anchors. Haydon is now stocking fully domestic weld studs. Haydon operates out of its 60,000 square foot manufacturing and distribution facility in Philadelphia. Haydon delivers the next day from Maine to North Carolina. Haydon is an associate member of AISC.

## Hercules Bolt Company

**Booth 607**  
Madison, TN  
**Ph:** 615.321.5020  
**Toll Free:** 877.321.5020  
[www.herculesbolt.com](http://www.herculesbolt.com)

Hercules Bolt Company is a veteran-owned, certified "SBE" company that is an industry leader in the manufacturing of anchor bolts, sag rods, all thread rods and studs and embeds, which are all proudly made with domestic material of all grades, alloys and sizes (bent or straight). Our strong distribution stock of structural bolts, concrete anchoring products, epoxies and our Blind Bolt and Lindapter products for HSA applications makes HBC a one-source stop for any job that needs on-time delivery with quality products. No job is too big or too small for Hercules Bolt Company.

## HGG Profiling Equipment

**Booth 1930**  
Charleston, SC  
**Ph:** 330.461.6855  
[www.hgg-group.com](http://www.hgg-group.com)

HGG is a leading supplier of pipe cutting machines, robotic profile cutting lines and associated cutting equipment solutions around the world. All HGG profiling equipment solutions are designed to profile complex beveled edges and 3D profiles made from steel.

## Hilti, Inc.

**Booth 401**  
Plano, TX  
**Toll Free:** 800.879.8000 (USA)  
**Toll Free:** 800.363.4458 (Canada)  
[www.us.hilti.com](http://www.us.hilti.com)  
[www.hilti.ca](http://www.hilti.ca)

Hilti is a world-leading manufacturer and supplier of quality, innovative and specialized tools and fastening systems for the professional user. With more than 1,350 highly trained Hilti account managers and engineers throughout North America and an additional 1,100 Hilti employees worldwide, Hilti expertise covers the areas of powder actuated fastening, drilling and demolition, diamond coring and cutting, measuring, firestopping, screw fastening, adhesive and mechanical anchoring and strut and hanger systems.

## Holloway Houston, Inc.

**Booth 108**  
Houston, TX  
**Ph:** 713.674.5631  
[www.hhlifting.com](http://www.hhlifting.com)

Holloway Houston, Inc. is the United States' largest single-location sling shop and testing complex. Our company, Holloway Houston, offers everything that's needed for your industrial lifting needs, combining quality products with state-of-the-art testing services made available at our world-class testing facility.



## exhibitors

### Holloway Steel Services

#### Booth 538

Saginaw, TX

Ph: 817.232.8663

Toll Free: 800.869.8663

[www.hollowaysteelservices.com](http://www.hollowaysteelservices.com)

Welcome to Holloway Steel Services. We specialize in structural steel rolling, plate rolling, ASME code vessels, shop-fabricated tanks and custom plate cutting. Holloway Company provides tube bending, bending of pipes, bar bending, beam bending, structural steel bending and plate rolling for OEMs and construction projects. We feature fabrication of structurally formed alloys, including tank manufacturing, plate rolling, angles, bars, bricklintel, pipe and tubes.

### Hougen Manufacturing, Inc.

#### Booth 814

Swartz Creek, MI

Ph: 810.635.7111

Toll Free: 800.426.7818

[www.hougen.com](http://www.hougen.com)

Hougen Manufacturing produces a full line of portable magnetic drills, Rotabroach annular cutters and other holemaking products for use in fabrication, production and maintenance applications. Hougen's products are for use onsite or in the shop to help make holes easier, faster and safer.

### House of Threads

#### Booth 724

Birmingham, AL

Ph: 205.916.2512

[www.houseofthreads.com](http://www.houseofthreads.com)

Since 1963, House of Threads has become one of the nation's largest fastener distributors. Today we own and operate distribution centers in strategic cities in the United States and Mexico. House of Threads offers innovative fastener solutions, including VMI (vendor-managed inventory) systems that are custom designed to fit the specific needs of each customer. Through our commitment to the philosophy of "continuous improvement" and by training our team members to increase their product knowledge we have built a team that is among the most technically qualified in the industry. We have formed many "partnership in quality" relationships since our inception. Many of them have been in place for over 35 years.

### Hutchinson Industries, Inc.

#### Booth 308

Trenton, NJ

Ph: 609.394.1010

[www.hutchinsoninc.com](http://www.hutchinsoninc.com)

Hutchinson is an industry leader in the design and manufacture of enhanced mobility components for wheeled vehicles within the defense, security, commercial and industrial markets. Our product offerings include Tactical aluminum wheels, runflats, beadlocks and thermal hub covers, Safetank explosion-resistant fuel tanks, complete turn-key assemblies, industrial polymer solutions and machined parts. Hutchinson's newest innovation, The Tire Saver Shield, provides protection to the highly stressed tire side walls of vehicles used in industrial environments.

### IDEA RS

#### Booth 24

Brno, Czech Republic

Ph: 420.725.078.287

[www.idea-rs.com](http://www.idea-rs.com)

IDEA RS provides a revolutionary software for structural design of steel connections/joints: IDEA StatiCa Connection. It is based on a new CBFEM method and allows structural engineers to design and check connections of all topologies in minutes. IDEA RS is improving workflow of engineers all around the world by linking this software to FEA and CAD software they use.

### Independence Tube Corporation

#### Booth 1105

Chicago, IL

Ph: 708.496.0380

Toll Free: 800.376.6000

[www.independencetube.com](http://www.independencetube.com)

Independence Tube Corporation is a leading manufacturer of square, rectangular and round structural steel tubing throughout North America. Founded in 1972, our customers include many of the finest steel service centers and manufacturers of agricultural, transportation, lighting and material-handling equipment located throughout the United States, Canada and Mexico.

### Indiana Anchor Bolt

#### Booth 433

Waterloo, IN

Ph: 260.837.3801

[www.indianaanchorbolt.com](http://www.indianaanchorbolt.com)

Domestic anchor bolt manufacturer. Specializing in single- and double-end threaded rods, sag rods, rod braces, mushroom bolts, timber bolts, straight and bent anchor bolts, L-bolts, J-bolts, square and round U-bolts, eye bolts, pig tail eye bolts, swedge bolts, welded anchor assemblies, wilson sleeve anchor bolts, hex-head bolts, machine head bolts, square head bolts, wire forms, smooth dowels, fabricated plates and angles. Coatings we use are HDG A-153, zinc clear plating and e-coating.

### Infasco/Ifastgroupe

#### Booth 110

Marieville, QC, Canada

Ph: 450.658.8741

Toll Free: 800.876.9473

[www.infasco.com](http://www.infasco.com)

Infasco has been in the fastener manufacturing business for almost 60 years and is recognized as one of the world's leaders in manufacturing and supplying high-strength structural bolts and nuts. Infasco manufactures and supplies hex-head A325 and A490 bolting, A563 structural nuts, tension control F1852 (A325TC) and F2280 (A490TC) bolting assemblies and type III weathering steel bolting products, as well as hot-dip galvanized and zinc aluminum flake coated fasteners from its factory in Canada as well as from strategically located distribution centers across Canada and the U.S. New Product: 1¼-in. F2280 (A490TC) bolting. A new line of high-strength bolting of 1¼-in.-diameter up to 14 in. in length. This new larger size will allow improved field assembly for fabricators and erectors and offer potential economies for steel construction with lower costs of erection and fewer bolts per connection. Ask for the Triangle!

### Informed Infrastructure

#### Booth 3

Denver, CO

Ph: 312.771.9818

[www.informedinfrastructure.com](http://www.informedinfrastructure.com)

The tools, products and technologies for improved project delivery are rapidly evolving. Informed Infrastructure provides civil and structural engineers' news and information about the latest products, specifications and approaches for successful design, engineering and construction. Make Informed Infrastructure your trusted news source for your next project.

## INFORMED INFRASTRUCTURE

The construction engineer's source for projects, products and technology

### InfoSight Corporation

#### Booth 533

Chillicothe, OH

Ph: 740.642.3600

Toll Free:

888.642.3600

[www.infosight.com](http://www.infosight.com)

At InfoSight, "we barcode difficult stuff." InfoSight has been solving the identification and traceability needs of metal manufacturers since 1993. Whether you require preprinted metal tags to track a single job from start to finish, a tag and laser printer system to print our durable metal tags on-site or you need InfoSights engineering team to design a custom piece of automated equipment, InfoSight has a solution to every marking and labeling need to fit every budget. At InfoSight we believe that a great identification system can reduce costs, eliminate errors, increase safety and—just possibly—give your company the edge over the competition. Many members of the galvanizing and fabrication community are already familiar with InfoSight's trio of tags designed to survive galvanizing, painting and shot blasting—KettleTag PLUS, PaintTag and ShotTag. Learn more at our booth.

### Infra-Metals Co.

#### Booth 1201

Langhorne, PA

Ph: 215.741.1000

Toll Free: 800.899.3432

[www.infra-metals.com](http://www.infra-metals.com)

Infra-Metals Co. is one of the largest structural steel service centers in the United States. We are well-positioned to satisfy your needs in New England, the Mid-Atlantic, the Midwest and Florida. As a subsidiary of a leading international company, Infra-Metals is provided with secure financing and has a strong commitment to steel distribution and processing. Infra-Metals offers unparalleled service with on-time delivery and a substantial lineup of processing equipment. Our qualified operators maintain a high level of expertise, and we constantly evaluate additions or replacements to our processing equipment that will allow us to accommodate your changing needs.

### Inovatech Engineering

#### Booth 1235

Vankleek Hill, ON, Canada

Toll Free: 877.453.0517

[www.inovatechengengineering.com](http://www.inovatechengengineering.com)

Inovatech Engineering manufactures the SteelPRO 900, a robotic plasma beam line that includes a flat plate table. The system allows for efficient plate (up to 24 ft × 10 ft) and beam (up to 44 in. wide) processing using a single robot. Designed with Hypertherm, Fanuc and Güdel components, the SteelPRO 900 raises the bar for what's expected in a plasma beam line.

### Insteel Engineers Pvt., Ltd.

#### Booth 228

Mumbai, India

Ph: 022.4111.2000

[www.insteellengg.com](http://www.insteellengg.com)

InSteel Engineers is an ISO9001: 2008 Certified company with 125+ engineers/detailers rendering services in the field of structural steel design and detailing, RCC design, rebar detailing and bar bending schedule (BBS), building information modeling (BIM), MEP services and structural steel fabrication.

### Integrus Steel Software Solutions

#### Booth 1200

Schererville, IN

Ph: 219.227.8015

[www.integrus.biz](http://www.integrus.biz)

Integrus Steel Software Solutions is a solutions company with multiple efficiency software solutions that focus on the needs of the steel industry. Our company was founded to utilize years of experience in the steel fabrication and software industries, researching and providing the latest technological solutions for problems faced by today's fabricators. We currently represent multiple software companies to help you and your company become more efficient and more profitable: FabSuite, P2 Programs, BlueBeam Software and Steel Erection Bid Wizard.



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Co., Inc.

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## exhibitors

### Intergraph Booth 126

Houston, TX  
Ph: 281.890.4566

[www.intergraph.com/ppm](http://www.intergraph.com/ppm)

For over 25 years, Intergraph has provided software for multiple plant design and engineering disciplines. Our structural analysis software, Intergraph GT STRUDL, is one of the world's most widely-used, fully-integrated and adaptable solutions. When combined with the Intergraph CADWorx Plant Design Suite, it provides an integrated environment where companies efficiently undertake the most challenging projects.

### International Design Services, Inc.

Booth 810  
St. Louis, MO  
Ph: 314.872.1791

[www.ids-inc.net](http://www.ids-inc.net)



IDS is committed to delivering the highest quality of detailing and connection design services. Our over 500 team members, including connection design engineers, detailers and supporting staff, provide ample manpower to support any project type and schedule. Our shop drawings and calculations are produced under the direct supervision of licensed professional engineers. In addition to 3D and BIM Models in SDS/2 or Tekla, IDS provides NC1, CNC, DXF, DSTV and other production file formats.

### Ironworker Management Progressive Action Cooperative Trust (IMPACT)

Booth 408  
Washington, DC  
Ph: 202.393.1147  
Toll Free: 800.545.4921

[www.impact-net.org](http://www.impact-net.org)

IMPACT is a labor management partnership designed to provide a forum for union ironworkers and their signatory contractors to address mutual concerns and encourage reasonable, balanced solutions. Our primary mission is to expand job opportunities through progressive and innovative labor management cooperative programs, providing expertise in ironworker and contractor training, construction certifications, safety, marketing and construction project tracking and bidding.

### ISA - Ajax Fasteners

Booth 634  
Placerville, CA  
Ph: 530.647.8225

[www.irasvens.com](http://www.irasvens.com)

Master distributor of Ajax Fasteners including the Oneside Structural Fastening Assembly, the only blind fastening system on the market, offering similar mechanical properties to A325 structural bolts.

### ITT Enidine

Booth 611  
Orchard Park, NY  
Ph: 716.662.1900

[www.enidine.com](http://www.enidine.com)

ITT Enidine provides custom energy absorption products for unique infrastructure applications worldwide. Our extensive product offerings in seismic and infrastructure protection are engineered to give you the most complete solution on the market today. Our linear damping devices, long and short stroke fluid viscous dampers and wire rope isolators can assist with the following critical applications: buildings, bridges, power and utility protection, nuclear power plants, oil and gas offshore structures and refineries.

### J.B. Long, Inc.

Booth 407  
Fleetwood, PA  
Ph: 610.944.8840

[www.jblong.com](http://www.jblong.com)

J.B. Long, Inc., has supplied structural steel and miscellaneous iron details to the fabrication industry for 30 years. The firm is certified under the NISD Quality Procedures Program (QPP). All those qualified of the total staff of 16 are certified under the NISD Individual Detailer Certification (IDC) program. J. B. Long, Inc., uses Steel Logic, Tekla Structures and AutoDesk Advance Steel to create details. The focus is on small to mid-sized structural and miscellaneous iron projects.

[www.aisc.org/nascc](http://www.aisc.org/nascc)

### Kinetic Cutting Systems, Inc.

Booth 1706  
West Burlington, IA  
Ph: 319.754.5040  
Toll Free: 800.606.2954

[www.kineticusa.com](http://www.kineticusa.com)

Kinetic Cutting Systems, Inc., manufactures a variety of precision CNC plasma and flame cutting machinery, as well as multi-process machines that combine machining operations such as drilling, tapping, milling and interpolation with cutting operations. Kinetic offers a complete solution for the structural steel industry. Kinetic machines process plates up to 8 in. thick, 20 ft wide and more than 200 ft long. See our patented dry table with through-spindle coolant and automatic table cleaning at the conference.

### KTA-Tator, Inc.

Booth 615  
Pittsburg, PA  
Ph: 412.788.1300  
Toll Free: 800.245.6379

[www.kta.com](http://www.kta.com)

KTA provides government, facility owners, engineers and contractors peace of mind that the integrity of steel and concrete structures are properly assessed and protected. KTA provides professional consultation and support during any phase of a project—design, construction, post-construction and maintenance. KTA's specialties include steel and concrete fabrication inspection; coatings and corrosion engineering and inspection; field and lab coatings failure analysis; and contract administration. KTA also distributes a complete line of field inspection instrumentation and provides specialized training courses.

### Lapeyre Stair

Booth 226  
New Orleans, LA  
Ph: 504.733.6009  
Toll Free: 800.535.7631

[www.lapeyrestair.com](http://www.lapeyrestair.com)

Accurate, timely, and easy to install stairs. Premanufactured egress stairs simplify the design process with pre-engineered landing and railing components to meet code requirements. Alternating tread stairs are a safe alternative to ladders, allow safe, comfortable face-forward descents at steep angles. Bolt-together steel stairs are the simplest and most cost-effective stair solutions available to design, ship and install.

### LARSA, Inc.

Booth 730  
Melville, NY  
Ph: 212.736.4326  
Toll Free: 800.LARSA.01

[www.larsa4d.com](http://www.larsa4d.com)

LARSA 4D analysis and design software addresses the specialized needs of cable-stay, suspension, curved, skewed and other bridge forms, as well as structures requiring geometric nonlinearity or a staged analysis. Standard in leading U.S. firms for bridge design and construction analysis, LARSA 4D continues to lead innovation in analysis and support.

### LeJeune Bolt Company

Booth 300  
Burnsville, MN  
Ph: 952.890.7700  
Toll Free: 800.872.2658

[www.lejeunebolt.com](http://www.lejeunebolt.com)

[www.tightenright.com](http://www.tightenright.com)

LeJeune's exclusive TNA Fastening System now has ASTM designation F3148. The specification allows specifying and use to an ASTM standard so users have the full backing and confidence that the industry has reviewed and accepted the system. Put an end to installation failures. Use 20% fewer bolts in every connection. Protect your workers by using the safest installation method available. Stop by our booth to "get your tight right."



### The Lincoln Electric Company

Booth 1221  
Euclid, OH  
Ph: 216.481.8100

[www.lincolnelectric.com](http://www.lincolnelectric.com)

Lincoln Electric is the world leader in the design, development and manufacture of arc welding products, robotic arc welding systems, plasma and oxy-fuel cutting equipment and has a leading global position in the brazing and soldering alloys market. Headquartered in Cleveland, Ohio, Lincoln has 47 manufacturing locations, including operations and joint ventures in 19 countries and a worldwide network of distributors and sales offices covering more than 160 countries.

### Lindapter USA

Booth 833  
Chester Springs, PA  
Ph: 610.590.2160

[www.lindapterusa.com](http://www.lindapterusa.com)

For over 80 years, Lindapter has pioneered the design and manufacture of structural steel clamping systems and HSS blind fasteners, enabling faster steel construction. Products include the Holo-Bolt, the only HSS expansion bolt approved by ICC-ES for all Seismic Design Categories (A through F), while the Girder Clamp is used for quickly connecting W&S beams. Lindapter connections eliminate the need for time-consuming drilling or welding in the field and reduce time and labor costs.



### LNA Solutions

Booth 600  
Ann Arbor, MI  
Ph: 888.724.2323

[www.lnasolutions.com](http://www.lnasolutions.com)

LNA Solutions provides structural steel connections methods without the need of field drilling or field welding. These methods provide savings in installation time and cost. LNA Solutions provides products and service out of offices and warehouses based in the USA. Service includes free designs for the use of BeamClamp Structural Steel Connections as well as BoxBolt Blind Structural Steel Connections. LNA Solutions has provided pre-engineered, high-quality structural steel connections in North America for over 20 years.



### Lohr Structural Fasteners, Inc.

Booth 816  
Houston, TX  
Ph: 281.446.6766  
Toll Free: 800.782.4544

[www.lohrfasteners.com](http://www.lohrfasteners.com)

Stop by our booth 816 to check out our Generation 2 Smart-hex TC and see why the Smart-hex is the smart choice for your projects. We will also have our line of TC installation tools and the nut buster (for easy fast bolt removable) on display. We look forward to seeing you at the 2016 convention.

### LS Industries

Booth 610  
Wichita, KS  
Ph: 316.265.7997  
Toll Free: 800.835.0218

[www.lsindustries.com](http://www.lsindustries.com)

LS Industries engineers, designs and manufactures metal cleaning equipment. We are a fully integrated manufacture of airless shot blast cabinets using conveyor and monorail systems. LS also has complete product lines of cleaning systems for rebar, pipe and tubing; dust collectors; parts washers and vibratory tubs.



# exhibitors



**LTC, Inc.**  
**Booth 1312**  
 West Salem, WI  
**Ph:** 608.786.1761  
[www.ltcsteeldetailers.com](http://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. We are committed to creating and maintaining strong customer relationships through quality and professionalism. We use 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 specialize in BIM and IPD services to the construction industry and offer all electronic data necessary for fully automated shops.

**LUSAS**  
**Booth 614**  
 New York, NY  
**Ph:** 646.837.8756  
**Toll Free:** 800.97.LUSAS  
[www.lusas.com](http://www.lusas.com)

LUSAS provides finite element analysis software for accurate and cost-effective design of steel and concrete bridges and other structures. Fundamental frequency, seismic, dynamic, nonlinear, buckling, fatigue, staged construction and curved girder analysis can be undertaken. AASHTO and other design codes are supported. Vehicle-load optimisation facilities provide worst-case loading patterns. Loading is mesh independent. Extensive results processing facilities include smart load combinations, mesh-independent slice sectioning of results, a report wizard, comprehensive graphing, contouring and animation facilities.

**Magni Group, Inc.**  
**Booth 609**  
 Birmingham, MI  
**Ph:** 248.647.4500  
[www.magnicoatings.com](http://www.magnicoatings.com)

Since 1974, leading manufacturers have trusted Magni to engineer integrated coatings solutions that provide industry-leading corrosion protection and functional performance for products across a variety of markets including agriculture, automotive, energy, construction, industrial, marine and military. Magni coatings are available through a network of more than 140 applicators worldwide.

**Max Weiss Co., LLC**  
**Booth 326**  
 Milwaukee, WI  
**Ph:** 414.355.8220  
**Toll Free:** 888.649.3477  
[www.maxweiss.com](http://www.maxweiss.com)

Our unique structural rolling/forming process and skilled craftsmen provide exceptional quality and tight radius bending with very minimal distortion or marring. We have the capability of rolling and forming a wide variety of sizes of structural steel sections and tubing easy way, hard way and off-axis to accommodate the most difficult and unique projects. We also offer many value-added fabrication services including splitting, notching, straightening, trimming, drilling, certified welding and much more.



**McLaren Engineering Group**  
**Booth 1228**  
 West Nyack, NY  
**Ph:** 845.353.6400  
[www.mgmclaren.com](http://www.mgmclaren.com)

McLaren is a cutting-edge multi-disciplinary engineering firm that specializes in steel building and bridge construction engineering design services. These include primary structural systems, complex connection design, miscellaneous metals, shoring/jacking, tower cranes, bid consultation and erection stability of structures. McLaren is licensed in 47 states, several U.S. territories and offers nine offices nationwide with 150+ gifted design professionals. McLaren's applied ingenuity delivers innovative solutions on every project. Contact: mkawczenski@mgmclaren.com for more information.

**MDX Software**  
**Booth 720**  
 Columbia, MO  
**Ph:** 573.446.3221  
[www.mdxsoftware.com](http://www.mdxsoftware.com)

MDX Software *Curved and Straight Steel Bridge Design and Rating* is in use by many top design firms and DOTs to design and rate steel girder bridges for compliance with AASHTO *Specifications*, the 7th Edition LRFD *Bridge Design Specifications*, the 2nd Edition *Manual for Bridge Evaluation* (LRFR) and the 17th Edition AASHTO *Standard Specification for Allowable Stress Design (ASD) and Load Factor Design (LFD)*.

**MECCO Marking and Traceability**  
**Booth 207**  
 Cranberry Township, PA  
**Ph:** 724.779.9555  
**Toll Free:** 888.369.9190  
[www.mecco.com](http://www.mecco.com)

Founded in 1889, MECCO is a leading U.S.-based manufacturer of industrial part identification systems, offering a full line of laser and dot peen marking technologies. MECCO provides solutions that create an automated marking process for full traceability implementation. Throughout the evolution of new marking techniques, MECCO has helped customers determine the best technology for their application, and the company uses its extensive experience to enable a greater understanding of the marking needs of today while providing a vision for developing the technologies of the future.

**Metals USA**  
**Booth 1314**  
 Langhorne, PA  
**Ph:** 267.580.2100  
**Toll Free:** 800.523.3340  
[www.metalsusa.com](http://www.metalsusa.com)

For over 20 years, Metals USA has been a premier supplier to structural fabricators across the United States. Offering multiple shapes and grades of carbon steel, Metals USA leads the industry with our value added processing including beam and plate drilling, tee splitting, cambering and plate bending to 60 ft. In 2014, Metals USA began marketing and producing castellated and cellular beams. Our Smartbeams are utilized in projects throughout North America. Our knowledgeable staff and many years of industry experience make Metals USA an excellent partner for all your steel needs.



**Meyer Borgman Johnson**  
**Booth 1308**  
 Minneapolis, MN  
**Ph:** 612.338.0713  
[www.mbjeng.com](http://www.mbjeng.com)

Meyer Borgman Johnson (MBJ) provides steel connection design (P.E. review and seal) and other construction engineering, erection engineering, BIM and IPD services to the structural steel community. Providing consistent quality services, economic solutions and timely results are our top priorities. These services are a subset of our broad structural engineering services for the built environment. We have 80+ structural engineers and are licensed throughout the country.

**Midwest Structural Products LLC**  
**Booth 1**  
 Indianapolis, IN  
**Ph:** 317.884.5443  
[www.midweststructuralproducts.com](http://www.midweststructuralproducts.com)

Midwest Structural Products is an exclusive structural bolt and construction related products distributor. The company and its members take pride in their knowledge and expertise and are strongly committed to providing industry leading services to our customers. Our centralized location permits for ease of shipping throughout the North American market. We look forward to working with you as we connect the world together, one fastener at a time.

**Mold-Tek Technologies, Ltd.**  
**Booths 121**  
 Akron, OH, and India  
**Ph:** 330.867.4505  
[www.moldtekindia.com](http://www.moldtekindia.com)

We offer structural steel detailing and engineering services, connection design certification and sealing with BIM coordination for all the major steel fabricators in the USA. Our company is a public corporation headquartered in India with its subsidiaries RMM Global, Inc., and Cross Roads Detailing, Inc., located in Akron, Ohio. We have a strong team of 400+ detailers, checkers and connections engineers in India, and our project managers and P.E.s from our U.S. operations manage all projects.

**National Institute of Steel Detailing, Inc.**  
**Booth 9**  
 Oakland, CA  
**Ph:** 510.568.3741  
[www.nisd.org](http://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.

**National Steel Bridge Alliance**  
**Booth 935**  
 Chicago, IL  
[www.steelbridges.org](http://www.steelbridges.org)



NSBA, a division of the American Institute of Steel Construction (AISC), is a national, not-for-profit organization dedicated to the advancement of steel bridge design and construction. NSBA functions as the voice of the bridge fabricators and steel mills while also partnering with the bridge design and construction community. NSBA's partners include members of the American Association of State Highway and Transportation (AASHTO), Federal Highway Administration (FHWA), State DOTs, design consultants, contractors and academia. With these resources, NSBA is uniquely positioned to find solutions to the toughest bridge challenges, including those related to cost, sustainability and performance.

**Nelson Stud Welding**  
**Booth 221**  
 Elyria, OH  
**Ph:** 440.329.0400  
**Toll Free:** 800.NEL.WELD  
[www.nelsonstud.com](http://www.nelsonstud.com)

Nelson Stud Welding, the acknowledged leading stud welding solution provider for the last 75 years, offers a full range of equipment, fasteners, and service to meet your application requirements. The innovative product designs help customers weld faster, and more reliably regardless of where the work needs to be done.

**New Millennium Building Systems**  
**Booth 821**  
 Fort Wayne, IN  
**Ph:** 260.969.3582  
[www.newmill.com](http://www.newmill.com)

New Millennium engineers and manufactures standard steel joists and steel decking, along with a full spectrum of special profile steel joists and unique steel decking systems. The company now produces Versa-Dek and Versa-Floor composite decking systems for highly aesthetic floor, ceiling and roof designs with significant overall project cost-savings.



## Nitto Kohki U.S.A., Inc.

### Booth 317

Roselle, IL

Ph: 630.394.9393

Toll Free: 800.323.8828

[www.nittokohki.com](http://www.nittokohki.com)

We manufacture the automatic feed magnetic base drills that self-regulate feed speed for optimum cutting with a number of safety features. These machines with JetBroach carbide-tipped cutters can significantly increase production while reducing labor hours and hazardous work. We also manufacture many other metalworking tools including portable hydraulic punches, bevelers, pneumatic and electric power tools.

## NSSB/MISA

### Booth 1204

Tokyo, Japan, and New York, NY

Ph: 212.660.6053

[www.xtb-bolt.com](http://www.xtb-bolt.com)

XTB extra high-strength structural bolts, with 200-ksi tensile strength, are now included in the new AISC 360-16 *Specification* as a new Group C, ASTM 3043 for twist-off-type tension-control bolt assemblies and ASTM 3111 for heavy-hex assemblies. They are a superior choice over large diameter A325 and A490 bolts for your building projects, making your connections more compact and economical, reducing connection material, hole-drilling, welding and installation costs.

## Nucor – Corporation

### Booths

1001//1002//1011

Charlotte, NC

Ph: 704.366.7000

[www.nucor.com](http://www.nucor.com)

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; steel grating and expanded metal; and wire and wire mesh. Nucor is North America's largest recycler.

## Nucor – Fastener Division

### Booths

1001//1002//1011

St. Joe, IN

Ph: 260.337.1600

Toll Free: 800.955.6826

[www.nucor-fastener.com](http://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.

## Nucor – Plate Mill Group

Booths 1001//1002//1011

Cofield, NC;

Tuscaloosa, AL

Ph: 252.356.3700

Toll Free:

877.626.8267

[www.nucorhertford.com](http://www.nucorhertford.com)

[www.nucortusk.com](http://www.nucortusk.com)

Manufacturer of carbon, alloy, high-strength low-alloy (HSLA), pressure vessel and heat treated (normalized and quench and tempered plate) that is available as discrete, cut-to-length and coiled plate. Nucor Steel Hertford County produces discrete plate through 3 in. thick, 124 in. wide and 1,035 in. long. Nucor Steel Tuscaloosa, Inc., produces hot rolled coil and temper-leveled plate up through 1 in. thickness and discrete plate up through 2.5 in. thickness, 96 in. in width and 720 in. long.

## Nucor – Vercor Decking, Inc.

### Booths

1001//1002//1011

Phoenix, AZ

Ph: 602.272.1347

[www.vercodeck.com](http://www.vercodeck.com)

Vercor Decking, Inc., is a manufacturer of steel roof and floor deck products, located in the western United States. Vercor currently has manufacturing plants in Phoenix and the California cities of Fontana (near Los Angeles) and Antioch (near San Francisco). Vercor features the new PunchLok II system, which utilizes the patented PunchLok II tool to achieve higher shear values at a lower cost through high-quality side-seam attachments.

## Nucor – Vulcraft Group

### Booths

1001//1002//1011

Darlington, SC

Ph: 256.845.2460

[www.vulcraft.com](http://www.vulcraft.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.

## Nucor-Yamato Steel Company

### Booths

1001//1002//1011

Blytheville, AR

Ph: 870.762.5500

Toll Free:

800.289.6977

[www.nucoryamato.com](http://www.nucoryamato.com)

Manufacturer of wide flange structural steel shapes (up through W14x730 columns, and W44 beams), H-piles (including HP16 and HP18), sheet piling, angles, channels and car building shapes. Grades include ASTM A36, ASTM A572, ASTM A588, ASTM A690, ASTM A709, ASTM A992, ASTM 913; and CSA G40.21-13 Grades 345WM and 345WMT.

## Nucor Grating

### Booth 1000

Florence, KY

Toll Free:

800.334.2047

[www.nucorgrating.com](http://www.nucorgrating.com)

Nucor Grating is a full service grating manufacturer. Our sales, estimating and drafting departments can take your requirements from structural drawings to detailed grating drawings and to completely fabricated ready to install grating. We are a manufacturer and fabricator, and can offer our customers complete "one source" responsibility. Products include standard welded bar grating, heavy duty welded bar grating, stainless steel welded bar grating, aluminum swage locked bar grating, GripSpan and ShurGrip safety grating.

## Ocean Machinery, Inc.

### Booth 1501

Fort Lauderdale, FL

Ph: 954.956.3131

Toll Free: 800.286.3624

[www.oceanmachinery.com](http://www.oceanmachinery.com)

Ocean Machinery, together with its manufacturing partners, has created unique, versatile and affordable solutions specifically for the small to medium fabricator, including the Ocean Avenger/Avenger PLUS—the world's best-selling CNC beam drill lines; the Ocean Clipper—the most compact CNC angle line; the Ocean Liberator—the most affordable CNC beam coping machine; the Ocean Blaster—the smallest footprint shot blasting solution; and several other game-changing solutions that improve the profitability of fabricators worldwide!

## Ovation Services, LLC

### Booth 16

Copley, OH

Ph: 330.400.2833

[www.4ovation.com](http://www.4ovation.com)

Ovation Services is a leading provider of engineering services. Combining experience, technology and a client-centric approach, Ovation Services provides structural steel detailing, connection design and BIM services across the United States. The acquisition of MMW, Inc., a Georgia-based detailing firm with over 30 years experience in the steel industry, gives Ovation Services a strong and talented project management team to ensure a quality product and to service its clients at a level above the capability of most subcontractors. Strong and innovative leadership, global resources, U.S.-based checking and project management makes Ovation Services uniquely qualified to take on challenging projects and execute them in a timely fashion.

## P2 Programs

### Booth 822

Dripping Springs, TX

Ph: 512.858.2007

Toll Free: 800.563.6737

[www.p2programs.com](http://www.p2programs.com)

P2 Programs sets the industry standard when it comes to barcoding and tracking your structural steel from raw material receipt to erection at the job site. Since 1986 we have been using Auto-ID technology to improve manufacturing process tracking. Using our "real-time" update capabilities with Fab-Suite, FabTrol and Romac, P2 Programs is the company with the technological expertise and experience you need for an affordable and successful solution to the challenges in your manufacturing operation.

## Pacific Stair Corporation

### Booth 210

Salem, OR

Ph: 503.390.8305

Toll Free: 800.477.8247

[www.pacificstair.com](http://www.pacificstair.com)

Pacific Stair Corporation, a leader in advanced stair system technology, has been located in Salem, Ore., for over 25 years. Pacific Stair develops, manufactures and provides a stair system that meets or exceeds current international building codes. Our stair systems are engineered to make the most efficient use of materials and labor, reducing costs and improving delivery times. Our customers know that we care about their schedule and required delivery dates.

## Pan Gulf Technologies Pvt., Ltd.

### Booth 215

Mumbai, India

Ph: 91.22.6156.6256

[www.pangulftech.com](http://www.pangulftech.com)

Pan Gulf Technologies Pvt., Ltd., is an ISO 9001 certified engineering service provider based in India with a staff strength of 200+, catering to customers worldwide. Our main activities are design and detail engineering in the fields of: 1) Civil: RCC design and rebar detailing; 2) Structural: Steel design and detailing (3D modeling); 3) Static equipment and FEA; and 4) Piping, electrical and instrumentation.

## Pannier Corporation

### Booth 623

Pittsburgh, PA

Ph: 412.323.4900

Toll Free: 877.726.6437

[www.pannier.com](http://www.pannier.com)

Industrial marking systems for structural steel identification. Automatic dot peen marking systems make deep marks that remain legible after cleaning and coating. Embossed metal tags remain legible after galvanizing and painting. Industrial ink jet systems and dot and stripe printers for easy, reliable piece marking. With over 100 years of experience, we can help you with your most challenging product identification needs. Visit [www.pannier.com/steelfab](http://www.pannier.com/steelfab) for more information.



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We will have a dedicated web page where you can submit your questions. Our team of experts, including an engineer and metallurgist, will answer all your concerns.

From our rolling practices to exploring the grades and sizes we produce. We will let you determine how HSS can fit into your next design, fabrication or structure.

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## exhibitors

### Paramount Roll and Forming, Inc.

#### Booth 929

Santa Fe Springs, CA  
Ph: 562.944.6151

[www.paramount-roll.com](http://www.paramount-roll.com)

Since 1963, our company specializes in rolling, bending and forming metal products such as aluminum, stainless, mild steel, and titanium. We also earned a reputation for providing outstanding quality, dependability and customer service.

### Peddinghaus Corporation

#### Booth 1301

Bradley, IL  
Ph: 815.937.3800

[www.peddinghaus.com](http://www.peddinghaus.com)

Peddinghaus Corporation, headquartered in Bradley, Ill., is an American manufacturer of CNC controlled equipment for the structural steel and heavy plate fabrication industries. With two manufacturing locations in the USA, Peddinghaus focuses on providing highly innovative and long-lasting solutions to fabricators of all shapes and sizes. These solutions are designed to increase the production of steel components and reduce costs for fabricators, thus enhancing profitability. Beyond just machinery, Peddinghaus offers a 24 hour customer help line and consumables department to ensure customer success at any time of day, no matter where in the world the installation may be located.

**Peddinghaus**

### Pieresearch

#### Booth 722

Arlington, TX  
Ph: 817.265.0980  
Toll Free: 800.342.2409  
[www.pieresearch.com](http://www.pieresearch.com)

Pieresearch manufactures the finest quality concrete accessories for the construction industry. Designed to insure the proper alignment of reinforcing steel cages in drilled shafts, slurry walls and mat foundations, Pieresearch is the industry leader in rebar cage alignment. We have integrated systems for every job and manufacture custom accessories to meet any specification.

### PPG Protective and Marine Coatings

#### Booth 1202

Pittsburgh, PA  
Toll Free: 888.9PP.GPMC  
[www.ppgpmc.com/northamerica](http://www.ppgpmc.com/northamerica)

PPG Protective and Marine Coatings offers a legacy of coatings solutions with proven performance and reliability in many demanding industries. Our customers count on us for the industry's broadest product offering, expansive distribution network and highly knowledgeable sales and technical teams.

### PythonX - Lincoln Electric

#### Booth 1221

Burlington, ON  
Canada  
Ph: 905.689.7771

[www.pythonx.com](http://www.pythonx.com)

The PythonX Structural Fabrication System is the #1 all-in-one robotic plasma system in the world, with close to 200 users. The PythonX simply takes in your detailing files and automatically processes beams, channels, HSS, angle and strip plate all on one machine. The PythonX can produce AISC-approved bolt holes, copes, slots, cut-outs, 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 operation in your plant. Four-week delivery.

### Qnect, LLC

#### Booth 830

Hadley, MA  
Ph: 413.387.4375  
[www.qnect.com](http://www.qnect.com)

Qnect builds software for the structural steel industry. Its breakthrough product, QuickQnect, makes it fast and easy to combine two critical components of the steel connection process into one. QuickQnect determines the type of connection needed between two joints, designs the connection and then connects the joint in one integrated automatic process for a multitude of simple and complex connection types. Dramatic schedule improvement is achieved.

### Quick Frames USA

#### Booth 11

Mesa, AZ  
Ph: 480.464.1500

[www.quickframes.us](http://www.quickframes.us)

QuickFrames are the only bolt-on, adjustable, pre-engineered roof opening frames for commercial buildings. Pre-engineered for a wide range of projects, QuickFrames are available in several strength levels to maximize load carrying ability while minimizing cost. Designed for new construction and tenant improvement, our frames can be easily moved when locations change and can also be installed from under the deck. QuickFrames ship quickly and arrive as a complete kit, saving you time, money and hassle.

### R.J. Watson, Inc.

#### Booth 709

Alden, NY  
Ph: 716.901.7020  
[www.rjwatson.com](http://www.rjwatson.com)

R.J. Watson designs, manufactures and markets high-load multi-rotational disc bearings, spherical bearings and rocker bearings, seismic isolation bearings, bridge expansion joints (small movement bonded joint seals and large movement finger joints), spray-applied waterproofing membranes and high-strength fiber composite materials.

### Radley Corporation

#### Booth 1129

Grand Rapids, MI  
Ph: 616.554.9060  
[www.radley.com](http://www.radley.com)

From raw materials receipts through an error-proof shipping process, now you can track material and assemblies with a simple barcode scan. Integrated with FabTrol MRP and FabTrol PRO, Radley's WorkForce Productivity Solutions incorporate an easy-to-use mobile barcode data collection system that provides real-time labor data so you can compare actual hours to your estimates. Visit our booth and find out how Radley's solutions can help streamline your operations, ensure traceability and increase productivity.

### Rapidrill, LLC

#### Booth 27

Hildale, UT  
Ph: 855.993.7455  
[www.rapidrill.com](http://www.rapidrill.com)

Rapidrill, LLC, a U.S.-based company, was brought about by metal-working professionals who wanted to get the job done faster, safer and easier. Rapidrill, a portable drill press attachment for drills, reduces drilling fatigue, reduces the risk of injury and extends drill bit life. Projects requiring days of hand-drilling through various materials can be done in hours with the Rapidrill tool. It is used in many industries across America. Visit our booth to see it happen.

### Real Technology, LLC

#### Booth 1230

Houston, TX  
Ph: 832.251.9400  
[www.realtechcad.net](http://www.realtechcad.net)

Real Technology offers our clients superior steel detailing services: proven technology, round-the-clock execution capabilities and the cost efficiencies of an offshore delivery structure. Our front and back offices work in tandem throughout your project's lifecycle to ensure success at every stage.

### Redaelli Structural Steel Cables

#### Booth 728

Milan, Italy, and Yorkshire, UK  
Ph: 39.02.2530.7350 (Italy)  
Ph: 44.1302.378327 (UK)

[www.redaelli.com](http://www.redaelli.com)

Redaelli is a world leading manufacturer of safety critical spiral strand and full locked coil steel cable assemblies, providing specialist design and technical expertise for complete cable solutions to tensile structure applications to cable supported bridges and long span lightweight cable net roof structures. Notable recent North American projects include the High Roller Ferris Wheel in Las Vegas, BC Place in Vancouver, Consol Energy Wing Tip Suspension Bridge in West Virginia and the Miami Dolphins Stadium's new cable-stayed roof canopy.

### RISA Technologies

#### Booth 521

Foothill Ranch, CA  
Ph: 949.951.5815  
Toll Free: 800.332.RISA  
[www.risa.com](http://www.risa.com)

RISA Technologies has been developing leading-edge structural design and optimization software for over 25 years. Our products are used by 24 of the top 25 U.S. design firms in over 70 countries around the world for towers, skyscrapers, airports, stadiums, petrochemical facilities, bridges, roller coasters and everything in between. The seamless integration of RISAFloor, RISA-3D and RISAFoundation creates a powerful, versatile and intuitive structural design environment, ready to tackle almost any design challenge.

### Romac Technologies

#### Booth 105

Denison, TX  
Ph: 903.327.8701  
Toll Free: 844.757.2777  
[www.romactechnologies.com](http://www.romactechnologies.com)

Romac was founded in 1982 to provide easy-to-use software solutions to help fabricators become more efficient in their day-to-day operations. Contact Romac when you are ready to take back control of your shop production, inventory, purchasing and estimating processes.

### S-Frame Software

#### Booth 629

Guilford, CT  
Ph: 203.421.4800  
[www.s-frame.com](http://www.s-frame.com)

S-Frame Software, a trusted global solution provider since 1981, is known for developing versatile structural engineering software suitable for both simple and complex structures, industrial and commercial projects. Analyze, design and detail structures regardless of geometric complexity, material types, loading conditions, nonlinear effects or design-code requirements. S-Frame Software solutions efficiently integrate analysis, steel design, concrete design and foundation design all within a single user interface to optimize your productivity.



**S-FRAME**  
SOFTWARE



# exhibitors



## SE University by SE Solutions, LLC

**Booth 938**

Holland, MI

**Ph:** 616.546.9420

[www.LearnWithSEU.com](http://www.LearnWithSEU.com)

SE University is a web-based continuing education resource for structural engineers, focused on helping you improve your business. SE University provides regularly scheduled live web seminars on a wide variety of topics, to help you increase productivity and profitability. The SEU Resource Center—including video tips and structural engineering information through the SEU Innovation Hub—is now part of every SE University subscription. Provide the benefit of ongoing education to your engineers by participating in SE University!

## Sherwin-Williams Protective and Marine

**Booth 617**

Cleveland, OH

**Ph:** 216.566.2000

**Toll Free:** 800.524.5979

[www.sherwin-williams.com/protective](http://www.sherwin-williams.com/protective)

Sherwin-Williams Protective and Marine Coatings' coatings are ideal for shop application and available through its over 4,000 distribution locations. Sherwin-Williams offers NACE and SSPC-certified corrosion experts to ensure that your project uses technologies that reduce the critical planned timeline and achieves its expected service life.



## Shop Data Systems, Inc.

**Booth 608**

Garland, TX

**Ph:** 972.494.2719

[www.shopdata.com](http://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-embedded quantity and material; import multiple files in seconds; import DSTV or DXF files; machine tool paths are applied automatically; tools with or without piece mark; automatic shape nesting; chain cutting; common line cutting; automatic plate trim; personalized training and support; and remnant inventory tracking.

## Short Span Steel Bridge Alliance

**Booth 636**

Washington, DC

**Ph:** 202.452.7100

[www.shortspansteelbridges.org](http://www.shortspansteelbridges.org)

The Short Span Steel Bridge Alliance (SSSBA) is a group of bridge and buried soil structure industry leaders who have joined together to provide educational information on the design and construction of short-span steel bridges in installations up to 140 feet in length. The SSSBA provides technical resources, economic data, case studies, partner listings, complimentary design support and free access to eSPAN140—an innovative preliminary design tool for short-span bridges.

## SidePlate Systems, Inc.

**Booth 1008**

Mission Viejo, CA

**Ph:**

949.238.8900

**Toll Free:**

800.475.2077

[www.sideplate.com](http://www.sideplate.com)

SidePlate Systems continues to evolve, and we now have a field-bolted Special Moment Frame (SMF). For over 20 years, we have partnered to engineer safe and efficient structures through innovation. Our designs reduce lateral steel tonnage, eliminate field welding, and shorten construction schedules on buildings in any design criteria. And the SidePlate Bolted connection now saves even more time and money.



## Simpson Strong-Tie Co.

**Booth 100**

Pleasanton, CA

**Ph:** 925.560.9000

**Toll Free:** 800.999.5099

[www.strongtie.com](http://www.strongtie.com)

For over 55 years, Simpson Strong-Tie has focused on creating structural products that help people build safer and stronger homes and buildings. The company has led the industry in structural systems research, testing and innovation, and works closely with industry professionals to provide code-listed, field-tested products and value-engineered solutions. Simpson Strong-Tie's extensive product offering includes connectors, fasteners, fastening systems, lateral-force resisting systems, anchors and products for concrete repair, strengthening and protection.

## Simsona Corporation

**Booth 733**

Rockville, MD

**Ph:** 301.774.0880

[www.simsona.com](http://www.simsona.com)

Simsona Corp. provides highest quality steel detailing (structural steel, misc. steel, rebar) and connection design services. All of our shop drawings are produced under supervision of highly trained engineers. We use Tekla Structures for steel detailing and produce CNC, DXF, DSTV and KSS files. Our project list includes commercial projects, schools, stadiums, hospitals, high-rise structures, multistory office buildings, hotels, airports, churches, industrial structures and refineries. We specialize in BIM services to construction industry.

## Skidmore-Wilhelm

**Booth 305**

South Euclid, OH

**Ph:** 216.481.4774

[www.skidmore-wilhelm.com](http://www.skidmore-wilhelm.com)

For more than 60 years, Skidmore-Wilhelm has helped our customers determine the torque-tension relationship for their fasteners. Recently, we have experienced significant growth by working with clients to provide customized solutions for them regarding testing of their fasteners. We are also the leading supplier of devices to test impact wrenches.

## SKM Industries, Inc.

**Booth 328**

Olyphant, PA

**Ph:** 570.383.3062

**Toll Free:** 800.851.8464

[www.skmproducts.com](http://www.skmproducts.com)

For over thirty years, SKM Industries, Inc., has been manufacturing the finest marking tools, office supply, craft products and do-it-yourself (DIY) solutions available. Millions of our products are in use today in manufacturing and fabrication facilities, industrial sites, offices, shops, schools and homes around the world. We welcome the opportunity to discuss our products, explore opportunities, troubleshoot a situation or offer solutions to your most stubborn marking challenges.

## Soitaab USA, Inc.

**Booth 2012**

Lombard, IL

**Ph:** 312.856.6970

[www.soitaabusa.com](http://www.soitaabusa.com)

Manufacturer of CNC Plasma, Water Jet, Flame and Laser cutting solutions for Steel fabrication in Shipyards, Steel Service Centers, Pipe Mills, Heavy Equipment, Rail, Pressure Vessels, Trailers, Wind Energy and more.

## SPS North America Intelligent Engineering

**Booth 734**

Portland, OR

**Ph:** 503.545.6600

[www.ie-sps.com](http://www.ie-sps.com)

SPS (Sandwich Plate System) is the new and creative technology that can replace both stiffened steel and reinforced concrete. SPS delivers a high stiffness to weight ratio and improved performance for structures. SPS elements are custom designed to meet the needs of each specific application such as bridges, stadia and terraces, building floors, walls, roofs, core systems and blast protection. SPS is the proud recipient of the AASHTO Innovation Initiative.

## SRG Onesource, LLC

**Booth 528**

Mission, KS

**Ph:** 913.291.2901

[www.srgonesource.com](http://www.srgonesource.com)

SRG originated in 1996 to aid conventional steel fabricators and metal building manufacturers with their additional workloads required for structural detailing services. Projects range from 5-2500 tons utilizing SDS/2 software. Our diverse expertise, NISD QPP and IDC certifications, advanced computer technologies, experienced personnel and client commitment result in a proven record of success and resource to our clients. AISC Members. Visit our website for examples of projects and drawings. Call Doug Letsch 913.291.2901 for additional information.

## St. Louis Screw and Bolt

**Booth 800**

Madison, IL

**Ph:** 314.389.7500

**Toll Free:** 800.237.7059

[www.stlouisscrewbolt.com](http://www.stlouisscrewbolt.com)

Selling direct to structural steel fabricators, St. Louis Screw and Bolt is one of the oldest structural bolt manufacturers in the U.S. We specialize in the manufacture and stocking of ASTM F3125 heavy-hex and tension-control structural bolts in grades A325/F1852/120ksi and A490/F2280/150ksi, types I and III, plain, mechanically galvanized, hot-dip galvanized, F1136 and F2833 coated. We also have a very large stock of many other construction fasteners including anchor bolts, weld studs and concrete anchors, just to name a few.



## Stainless Structurals America

**Booth 410**

Conroe, TX

**Ph:** 936.538.7600

**Toll Free:** 877.739.6057

[www.stainless-structurals.com](http://www.stainless-structurals.com)

Stainless Structurals is a global producer and supplier of stainless steel structural shapes and special custom profiles. Our structural sections are available from stock in both 304/L and 316/L. We also offer profiles in other alloys, including duplex, straight from production. Our innovative Laser Fusion technology is certified to ASTM A-1069 and allows us to offer profile solutions where others cannot. Start with the solution. Start with Stainless Structurals.

## Star Seismic

**Booth 601**

Park City, UT

**Ph:** 435.940.9222

[www.star seismic.net](http://www.star seismic.net)

Star Seismic buckling restrained braces are the superior seismic system for use in both retrofit and new construction. Better performance can be achieved using fewer braces with fewer and smaller connections and less demands on existing foundation systems. Cost and schedule savings can be significant while achieving increased performance of the structure. Let Star Seismic's team of experts assist your team in finding an optimal solution to your next new or retrofit construction project.

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INSPECTION MODULE • QA TESTING • RESOURCE MANAGEMENT • REMOTE LINK

## OUR VALUES

Honoring Our  
Commitments

Advancing Our  
Team Members

Partnering With  
Our Clients

Driving Technology  
Into The Industry

## OUR MISSION

To elevate the  
steel fabrication  
industry by  
envisioning and  
implementing  
superior solutions  
which enable our  
partners to  
achieve higher  
efficiencies and  
greater success.

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# exhibitors



## Steel Deck Institute Booth 836

Glenshaw, PA  
Ph: 412.487.3325  
[www.sdi.org](http://www.sdi.org)

The Steel Deck Institute (SDI) is a trade association representing 18 full members and ten associate members. Full Members are manufacturers of steel deck and Associate Members are manufacturers of fasteners and other products related to the use of steel deck. The SDI publishes manuals for roof deck, floor deck and diaphragm design. The *Diaphragm Design Manual* (DDM04) is our most recent publication.

## Steel Dynamics Structural and Rail Division Booth 921

Columbia City, IN  
Ph: 260.625.8100  
Toll Free: 866.740.8700  
[www.stld-cci.com](http://www.stld-cci.com)



Steel Dynamics, Inc., is one of the largest steel producers and metals recyclers in the U.S., with annual sales of \$8.8 billion in 2014, over 7,700 employees and manufacturing facilities primarily located throughout the United States (including six steel mills, eight steel processing facilities, two iron production facilities, over 90 metals recycling locations and six steel fabrication plants). The Structural and Rail Division produces a wide range of structural shapes and rail.

## Steel Erectors Association of America Booth 428

Winston-Salem, NC  
Ph: 336.294.8880  
[www.seaa.net](http://www.seaa.net)

Founded in 1972, the Steel Erectors Association of America (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. SEAA provides support and representation on steel erection issues that serves the global needs of industry, government and the public. Because of its strong membership, SEAA is proactive in meeting industry needs and responsive to worldwide steel erection and construction issues.

## Steel Founders' Society of America Booth 436

Ph: 815.455.8240  
[www.sfsa.org](http://www.sfsa.org)

SFSA, akin to AISC, is a technical association. Members of SFSA are steel foundries who supply a range of cast steel products for demanding environments such as railroad, mining, construction, military and nuclear. SFSA can assist you in utilizing steel castings for building construction. Steel castings offer performance, aesthetics, design freedom and green manufacturing.

## Steel Joist Institute

Booth 839  
Florence, SC  
Ph: 843.407.4091  
[www.steeljoist.org](http://www.steeljoist.org)

The Steel Joist Institute (SJI), a nonprofit organization of active joist manufacturers and other organizations and companies connected to the industry, was founded in 1928 to address the need for uniform joist standards within the industry. Today, the Institute continues to maintain the standards for steel joist construction. In addition, the SJI provides educational opportunities for construction professionals utilizing a library of printed publications and both live and recorded webinars. We also offer assistance in identifying existing joists in buildings undergoing retrofit.

## Steel Projects Booth 1323

Tampa, FL  
Ph: 813.480.7017  
[www.steelprojects.com](http://www.steelprojects.com)

We help steel fabricators save money and be more productive through the design, development, support and maintenance of our Intelligent Steel Fabrication Software: Steel Projects PLM. Our focus is on improving efficiency where it matters: on the shop floor. Steel Projects is part of the Ficep group, the leading manufacturer of machine tools for the steel construction fabrication industry.

## The Steel Report

Booth 435  
San Ramon, CA  
Ph: 925.324.5620  
[www.thesteelreport.com](http://www.thesteelreport.com)

With decades of staff experience in the steel industry and a general skepticism at the current state of steel reporting, *The Steel Report* aims to bring subscribers the freshest steel prices and sharpest market intel with updates throughout the day. *The Steel Report* is based in the U.S. and includes both domestic and import reporting along with key global perspectives, covering all product segments: longs, flats, pipe and tube and scrap and all links in the steel supply chain: raw materials, steel production, distribution, fabrication and end users.

## Steel Studio, Inc.

Booth 1135  
East Weymouth, MA  
[www.steelconnectionstudio.com](http://www.steelconnectionstudio.com)

Steel Studio, Inc., also involved in structural steel engineering and detailing, develops and markets SCS—Steel Connection Studio, a software tool to help engineers design connections. SCS embraces the flexibility of a spreadsheet and combine it with highly performing productivity tools. APIs and macros to import and export data to/from other software (Tekla, Sap2000 and the like) are now available. Complex brace connections and seismic design on the way too; download a demo from [www.scs.pe](http://www.scs.pe).

## Steel Tube Institute

Booth 206  
Chicago, IL  
Ph: 847.461.1701  
[www.steeltubeinstitute.org](http://www.steeltubeinstitute.org)

The Steel Tube Institute was formed in 1930. A group of manufacturers joined forces to promote and market steel tubing. Their goal was to mount a cooperative effort that would improve manufacturing techniques and inform customers about their products' utility and versatility. This remains the basic motivation for the Institute's efforts today.

## Steelmax Tools, LLC

Booth 1208  
Englewood, CO  
Ph: 303.690.9146  
Toll Free: 877.833.5629  
[www.steelmax.com](http://www.steelmax.com)

Steelmax Tools offers a full line of steel fabrication machines and is committed to providing industry leading metal cutting, hole making, weld preparation and welding mechanization solutions to our customers. Each of our products is designed to help our customer be more productive and in turn more profitable and more competitive. Our commitment to our customers does not end there; we continue to learn from them and use that knowledge to develop new and innovative steel fabrication solutions.

## Strand7 Pty., Ltd. Booth 509

Sydney, Australia  
Ph: 011.61.2.9264.2977  
[www.strand7.com](http://www.strand7.com)

Strand7 software is an advanced general-purpose FEA system used by engineers worldwide for a wide range of structural analysis applications. It comprises integrated pre-processing, CAD import/export, automeshing, post-processing and solvers. Strand7 offers significant nonlinear analysis capabilities including material, geometric and contact nonlinearity. At NASCC 2016 we will be demonstrating our upcoming new release, Strand7 R3, a major new version of the software offering a new interface, accelerated Direct X graphics and 64-bit architecture.

## StruCIM/Predator Booth 2025

Blacksburg, VA  
Ph: 888.634.6020  
[www.strucim.com](http://www.strucim.com)

The StruCIM/P3 Predator platform is a fully automated system for robotic cutting and welding that takes your structural designs from engineering data to fabricated assemblies within a single integrated solution. The Predator workcell is flexible and designed to fit your operations regardless of floorspace or material handling needs. The StruCIM software is user-friendly and easy to integrate into your operations. StruCIM and P3 Predator systems have produced dramatic results for fabricators worldwide.

## Structural Engineering Institute of ASCE

Booth 536  
Reston, VA  
Toll Free: 800.548.2723  
[www.asce.org/SEI](http://www.asce.org/SEI)

Join more than 25,000 members of the Structural Engineering Institute of ASCE to advance your career and build the future of the structural engineering profession. SEI provides resources that advance the profession through research, education and standards development as well as networking opportunities that drive the practical application of cutting-edge research. Visit our booth to learn more, and join us at Structures Congress, April 6–8, 2017, in Denver, Colo.

## Structural Stability Research Council (SSRC) Booth 12

Chicago, IL  
Ph: 312.670.7015  
[www.stabilitycouncil.org](http://www.stabilitycouncil.org)

The Structural Stability Research Council (SSRC) is a technical organization that focuses on the state-of-the-art understanding of the impact of stability related issues on the analysis, design and behavior of metal structures. SSRC is comprised of engineers, educators and industry members with an interest in stability related issues.

## StruMIS, LLC Booth 827

Exton, PA  
Ph: 610.280.9840  
[www.strumis.com](http://www.strumis.com)

StruMIS, LLC, is a world-leading developer of software solutions for the international structural steel industry since 1986. Our software products, which include steel estimating, fabrication information and production management, and project collaboration tools have consistently transformed our customers' business within the structural steel construction supply chain. StruMIS has global operations providing sales, training and technical services that support our customers.



## exhibitors

### Sumter Coatings, Inc. Booth 227

Sumter, SC  
Ph: 803.481.3400  
Toll Free: 888.471.3400  
[www.sumtercoatings.com](http://www.sumtercoatings.com)

Sumter Coatings manufactures a comprehensive line of industrial primers, intermediates and finish coats. Whether it's a shopcoat primer to protect steel prior to erection, or a complete coating system for long-term protection and aesthetics, we can meet the painting needs of the steel fabricator. Our coatings meet the most popular SSPC, MPI and federal specifications.

### Sunbelt Metals and Mfg., Inc.

Booth 15  
Apopka, FL  
Ph: 407.889.8960  
[www.sunbeltmetals.com](http://www.sunbeltmetals.com)



Sunbelt Metals provides the most competitive pricing, highest quality and the best service on processed materials ranging from high-definition plasma, laser and water jet cutting, all structural shapes, brass, stainless steel and many other materials processed to desired specifications. Sunbelt offers a full fabrication department including full-penetration welding to light MIG and TIG, a full machine shop housing numerous CNC machines, sandblasting, electrostatic, powder coating and a paint facility. We also have an in-house design and detailing team.

### Taylor Devices, Inc. Booth 632

North Tonawanda, NY  
Ph: 716.694.0800  
[www.taylordevices.com](http://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 506

Vancouver, BC, Canada  
Ph: 778.997.1646

[www.tdsindustrial.com](http://www.tdsindustrial.com)

Steel detailers since 1979. Structural—Miscellaneous—Plate Work—Bridges.

### Techflow, Inc.

Booth 1207  
Trussville, AL  
Ph: 205.228.0960  
[www.techflowengg.com](http://www.techflowengg.com)

Techflow, Inc., located in Birmingham, Ala., with support staff in Mumbai, India, offers the best in 3D steel detailing, BIM coordination, connection design, pre-detailing setup and estimating. With our project management and coordination staff in Birmingham and 350 detailers and checkers in India, we provide the best in US quality and competitive pricing, utilizing Tekla, SDS/2 and BoCad. Techflow, Inc. is ISO-9001 Certified and holds both AISC and NISD memberships and gives back through service in these organizations. We provide quality detailing to your standards, on time.

### Tennessee Galvanizing

Booth 605  
Jasper, TN  
Ph: 423.942.1020  
Toll Free: 877.242.5848

[www.tennesseegalvanizing.com](http://www.tennesseegalvanizing.com)

We are a leading provider hot-dip galvanizer for fabricated steel and fastener hardware for the steel industry. Four kettles to handle any lead time customers need. Our largest kettle is 42 ft long x 5 ft wide and 7 ft deep. We can galvanize small fasteners up to 54 ft beam. Same-day service is available, if set up in advance. We are the only locally owned and operated galvanizing plant in the state of Tennessee.

[www.aisc.org/nascc](http://www.aisc.org/nascc)

### Totten Tubes, Inc. Booth 929

Azusa, CA  
Ph: 626.812.0113  
Toll Free: 800.882.3748  
[www.tottentubes.com](http://www.tottentubes.com)

Totten Tubes carries the largest range of HSS in North America. The company also stocks black and galvanized pipe along with mechanical tubing. Services include delivery and saw cutting. The company also contracts with outside vendors for hot-dip galvanizing, bending, sand blasting and laser cutting. Totten markets throughout North America and ships from Phoenix, Lathrop, Santee and Azusa (Arizona and California Service Centers).

### Trilogy Machinery, Inc.

Booth 1700  
Belcamp, MD  
Ph: 410.272.3600  
Toll Free: 888.988.ROLL  
[www.trilogymachinery.com](http://www.trilogymachinery.com)

Trilogy Machinery, Inc., is the exclusive North American distributor for Roundo Bending Rolls and Warcom press brakes as well as exclusive USA distributor for Sunrise Ironworkers, including CNC models, Lemas plate bending rolls, Akyapak bending rolls and Inductaflex machines. Trilogy offers sales, service and support for every brand they sell from their Maryland headquarters as well as local dealers around the country.

### Trimble

Booth 1015  
Kennesaw, GA  
Ph: 770.426.5105  
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Trimble is dedicated to transforming the planning, design, construction and operation of buildings through advanced, accessible, intuitive technologies. One of these technologies is Tekla Software. Built on reliable and constructible information, Tekla models provide a complete solution for building construction. From structural analysis and design, construction documents through to steel detailing and fabrication, Tekla's 3D BIM environment allows an accurate flow of information which increases efficiency and execution.

### Triple-S Steel Holdings

Booth 409  
Houston, TX  
Ph: 713.697.7105  
Toll Free: 800.231.1034  
[www.sss-steel.com](http://www.sss-steel.com)

Triple-S Steel Holdings, a family of steel service centers with locations in Texas, Louisiana, California, Colorado, Arizona, Utah, New Mexico, Georgia and Colombia, keeps over 200,000 tons of steel products in stock for quick deliveries to its customers. Specializing in beams, plate and other structural sections, we also offer services including saw-cutting, plate processing, blast and paint, cut-to-length temper mill, shearing, slitting, blanking, coil processing and export. Coast to coast and across the world, Triple-S Steel, Intsel, R&S Steel and Steckerl Aceros are prepared to meet all your steel requirements!

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### TurnaSure, LLC Booth 517

Langhorne, PA  
Ph: 215.750.1300  
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[www.turnasure.com](http://www.turnasure.com)



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Turnasure Direct Tension Indicators provide the most cost effective solution to achieving the correct tensions on high-strength bolts, studs and anchor bolts. They have grown in use worldwide on major projects and other bolting applications since our legacy company invented them in 1962. They are manufactured to several ASTM Standards and in the European Union to EN 14399-9. Turnasure is the world's leading manufacturer of these fasteners.

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Booth 429  
Fishers, IN  
Ph: 317.842.2420

[www.tuttlehandrailings.com](http://www.tuttlehandrailings.com)

Tuttle, A Dant Clayton Division (formerly Tuttle Railing Systems), located just outside of Indianapolis, Ind., is the largest fabricator of non-ferrous welded and mechanical railings in the United States. We fabricate stainless steel, aluminum and glass railings from our 80,000-sq.-ft facility, which is equipped with the latest in high-tech welders, bending machines and polishing equipment, as well as the latest in AutoCAD and bidding software in our offices.

### TUV Rheinland Industrial Solutions

Booth 638  
Caledonia, MI  
Ph: 612.770.6820  
Toll Free: 800.748.0208  
[www.tuvis.com](http://www.tuvis.com)

TUV Rheinland Industrial Solutions (TRIS) provides steel inspection services for state and private agencies throughout North America. TRIS has provided quality assurance inspections on projects as small as bridge handrails and as large as the Boston Central Artery/Tunnel project. A recognized leader in the bridge quality assurance inspection field, TRIS has provided consultant services for a variety of field inspection projects such as beam end repairs, pin and hanger evaluations and various forms of non-destructive testing.

### Unytite, Inc.

Booth 17  
Peru, IL  
Ph: 815.224.2221  
Toll Free: 800.869.9119  
[www.unytiteusa.com](http://www.unytiteusa.com)

Unytite, Inc., is a leading domestic manufacturer of structural nuts and bolts for the construction and heavy equipment industries. Using completely domestic material and manufacturing processes, Unytite is an innovative fastener company that is capable of manufacturing standardized products along with specialties made to print. Featured products include tension control bolt assemblies, heavy-hex structural bolts and heavy-hex structural nuts.

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Booth 1211  
Columbus, OH  
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[www.hotdipgalvanizing.com](http://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 over 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. Call us for all of your corrosion protection needs.



# exhibitors



## Valmont Coatings Booth 729

Omaha, NE  
Ph: 402.359.6145  
[www.valmont.com](http://www.valmont.com)

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## Vesam Group Booth 732

Cantanhede  
Portugal  
Ph: 351.231.419.320  
[www.vesamgroup.com](http://www.vesamgroup.com)

The Vesam Group provides integrated solutions in steel and mixed construction worldwide, including the design, fabrication, erection, monitoring and maintenance works. Our core business are residential and services buildings, industrial units, bridges and special structures. Vesam offers to all clients an innovative and integrated approach based in the use of the SIGMA system to perform the structural health monitoring of the construction in real time and at distance. We believe that the life-time of the construction can be extended and the maintenance costs significantly reduced.

## Viking Blast and Wash Systems Booth 621

Rose Hill, KS  
Ph: 316.634.6699  
Toll Free: 800.835.1096  
[www.vikingcorporation.com](http://www.vikingcorporation.com)

Viking Blast and Wash Systems offers a full line of industrial cleaning equipment including airless shot blast systems, parts washers and vibratory degreasers. This equipment cleans and removes mill scale, dirt and rust from a wide variety of materials including plate steel, structural I-beams, weldments and pipe. Viking's abrasive blast systems provide clean, uniform surfaces for better paint adhesion or other finishing operations.

## Voortman Steel Group Booth 1822

Monee, IL  
Ph: 708.885.4900  
[www.voortman.net](http://www.voortman.net)

Voortman is the global technology leader established over 40 years ago and has been manufacturing machine tools for our business partners to increase productivity and profitability. Voortman partners experience cutting edge CNC machinery that processes profiles and plate utilizing high-speed precision processing technologies that ensures reliability and durability, backed by Voortman's advanced remote and field support. Voortman only uses reputable components suppliers to ensure part availability and future support.

## Voss Engineering, Inc. Booth 530

Lincolnwood, IL  
Ph: 847.673.8900  
Toll Free: 800.323.3935  
[www.vossengineering.com](http://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. Voss' product line includes the following structural bearing pad materials: SOBRTEX (preformed fabric pad/cotton duck pad/CDP), VSB Slide Bearings (PTFE and steel plate), VTB (thermal break pad), NEOSORB (AASHTO grade neoprene (polychloroprene) and FIBERLAST or VOSSCO (random oriented fiber pads).

## Zinga USA Booth 204

Cheektowaga, NY  
Ph: 716.810.1550  
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## exhibitors

(as of March 10, 2016)

- |  |   |  |  |
|--|---|--|--|
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| 2 Gravotech, Inc.  | 407 J.B. Long, Inc.                                       | 700 Buckner Companies  | 1008 SidePlate Systems, Inc.                         |
| 3 Informed Infrastructure                                    | 408 Ironworker Management                                 | 705 AZZ Galvanizing Services   | 1011 Nucor (Corporation/                             |
| 4 American Galvanizers Association                           | Progressive Action  | 706 Birmingham Fastener  | Fastener Division/                                   |
| 6 Engineering Ministries International                       | Cooperative Trust (IMPACT)                                | 709 R.J. Watson, Inc.  | Plate Mill Group/                                    |
| 7 Abtech, LLC  | 409 Triple-S Steel Holdings                               | 710 Fabreeka International, Inc.   | Verco Decking, Inc./                                 |
| 8 Black Rook/  | 410 Stainless Structurals America                         | 711 BendTec, Inc.  | Vulcraft Group/                                      |
| Reyami Steel Construction and Engineering                    | 413 Gerdau  | 712 Eastern Pneumatics and Hydraulics, Inc./   | Yamato Steel Company)                                |
| 9 National Institute of Steel Detailing, Inc.                | 414 DEICON  | McCann Equipment, Ltd.   | 1015 Trimble   |
| 11 Quick Frames USA  | 416 Cerbaco, Ltd.   | 717 Acrow Corporation of America   | 1021 AVEVA, Inc.                                     |
| 12 Structural Stability Research Council (SSRC)              | 421 ESAB Welding and Cutting Products                     | 720 MDX Software   | 1026 Future Fabricating                              |
| 15 Sunbelt Metals and Mfg., Inc.                             | 426 Atema, Inc.   | 721 Canam-Bridges  | 1027 CADeploy, Inc.                                  |
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| 24 IDEA RS   | 433 Indiana Anchor Bolt                                   | 732 Vesam Group  | 1135 Steel Studio, Inc.                              |
| 27 Rapidrill, LLC  | 435 The Steel Report                                      | 733 Simsona Corporation  | 1200 FabSuite – Steel Management Software            |
| 28 Beijing Jinzhaobo High Strength Fastener Co., Ltd.        | 436 Steel Founders' Society of America                    | 734 AT&F   | 1200 Integrous Steel Software Solutions              |
| 100 Simpson Strong-Tie Co.                                   | 437 Exact Detailing                                       | 734 SPS North America  | 1201 Infra-Metals Co.                                |
| 105 Romac Technologies                                       | 505 Cleveland City Forge                                  | 800 Intelligent Engineering  | 1202 PPG Protective and Marine Coatings              |
| 106 Fein Power Tools, Inc.                                   | 506 TDS Industrial Services, Ltd.                         | 801 St. Louis Screw and Bolt Design Data   | 1204 NSSB/MISA                                       |
| 107 American Welding Society                                 | 508 Brown Consulting Services, Inc.                       | 804 Haydon Bolts, Inc.   | 1205 Delta Structural Steel Services Group           |
| 108 Holloway Houston, Inc.                                   | 509 Strand7 Pty., Ltd.                                    | 806 Core Brace, LLC  | 1207 Techflow, Inc.                                  |
| 110 Infasco/fastgroupe                                       | 517 TurnaSure, LLC  | 810 International Design Services, Inc.  | 1208 Steelmax Tools, LLC                             |
| 111 Birmingham Rail and Locomotive                           | 521 RISA Technologies                                     | 811 Bentley Systems, Inc.  | 1211 V&S Galvanizing                                 |
| 116 Grating Fasteners, LLC                                   | 528 SRG Onesource, LLC                                    | 814 Hougen Manufacturing, Inc.   | 1215 Graitec   |
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| 122 Construction News and Report Publishing, Inc.            | 533 InfoSight Corporation                                 | 820 Applied Bolting Technology, Inc.   | 1226 Bushwick Metals/ AZCO Steel                     |
| 126 Intergraph   | 534 D-MAC SAME DAY Steel Deck                             | 821 New Millennium Building Systems  | 1228 McLaren Engineering Group                       |
| 200 Gantrex, Inc.  | 536 Structural Engineering Institute of ASCE              | 822 P2 Programs  | 1230 Real Technology, LLC                            |
| 201 CS Unitec  | 538 Holloway Steel Services                               | 826 Bluebeam Software, Inc.  | 1235 Inovatech Engineering                           |
| 204 Zinga USA  | 600 LNA Solutions   | 827 StruMIS, LLC   | 1300 American Punch Co.                              |
| 206 Steel Tube Institute                                     | 601 Star Seismic  | 830 Qnect, LLC   | 1301 Peddinghaus Corporation                         |
| 207 MECCO Marking and Traceability                           | 604 Bradken, Inc.   | 833 Lindapter USA  | 1304 Allied Machine and Engineering Corp.            |
| 208 CloudCalc, Inc.  | 605 Tennessee Galvanizing                                 | 836 Steel Deck Institute   | 1306 CAMBCO, Inc.                                    |
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| 210 Pacific Stair Corporation                                | 608 Shop Data Systems, Inc.                               | 839 Steel Joist Institute  | 1310 TritonTek                                       |
| 211 Greenbrook Engineering Services                          | 609 Magni Group, Inc.                                     | 905 ArcelorMittal International  | 1312 LTC, Inc.                                       |
| 215 Pan Gulf Technologies Pvt., Ltd.                         | 610 LS Industries   | 909 Canam Buildings  | 1314 Metals USA                                      |
| 221 Nelson Stud Welding                                      | 611 ITT Enidine   | 915 FabSuite – Steel Management Software   | 1323 Ficep Corporation                               |
| 226 Lapeyre Stair  | 613 Bridge Grid Flooring Manufactures Association (BGFMA) | 921 Steel Dynamics Structural and Rail Division  | 1323 Steel Projects                                  |
| 227 Sumter Coatings, Inc.                                    | 614 LUSAS   | 929 Paramount Roll and Forming, Inc.   | 1501 Ocean Machinery, Inc.                           |
| 228 Insteel Engineers Pvt., Ltd.                             | 615 KTA-Tator, Inc.                                       | 929 Totten Tubes, Inc.   | 1523 Controlled Automation, Inc.                     |
| 300 LeJeune Bolt Company                                     | 616 D.S. Brown Company                                    | 935 American Institute of Steel Construction   | 1700 Trilogy Machinery, Inc.                         |
| 305 Skidmore-Wilhelm   | 617 Sherwin-Williams Protective and Marine                | 935 National Steel Bridge Alliance   | 1706 Kinetic Cutting Systems, Inc.                   |
| 306 DACS, Inc.   | 621 Viking Blast and Wash Systems                         | 938 SE University by SE Solutions, LLC   | 1722 Daito U.S.A., Inc.                              |
| 307 Dlubal Software, Inc.                                    | 623 Pannier Corporation                                   | 1000 Nucor Grating   | 1730 AGT Robotics                                    |
| 308 Hutchinson Industries, Inc.                              | 625 DGS Technical Services, Inc.                          | 1001 Nucor (Corporation/ Fastener Division/ Plate Mill Group/ Verco Decking, Inc./ Vulcraft Group/ Yamato Steel Company) | 1734 Ercolina – CML USA, Inc.                        |
| 309 FHS – Overhead Cranes, Hoists and Material Handling Sys. | 625 eCADsystems, Inc.                                     | 1002 Nucor (Corporation/ Fastener Division/ Plate Mill Group/ Verco Decking, Inc./ Vulcraft Group/ Yamato Steel Company) | 1801 AKYAPAK USA, LLC                                |
| 310 Chicago Clamp Company                                    | 629 S-Frame Software                                      |  | 1815 Behringer Saws, Inc.                            |
| 311 ComSlab  | 631 Danny's Construction Company, LLC                     |  | 1822 Voortman Steel Group                            |
| 314 Euroboor USA, Inc.                                       | 632 Taylor Devices, Inc.                                  |  | 1830 Ajan Elektronik Servis San. Ve Tic., Ltd., Sti. |
| 317 Nitto Kohki U.S.A., Inc.                                 | 633 Anatomic Iron Steel Detailing                         |  | 1913 Cleveland Punch and Die Co.                     |
| 320 Descon Plus, Ltd.  | 634 ISA – Ajax Fasteners                                  |  | 1923 Davi, Inc.                                      |
| 321 Atlas Tube   | 636 Short Span Steel Bridge Alliance                      |  | 1930 HGG Profiling Equipment                         |
| 326 Max Weiss Co., LLC                                       | 638 TUV Rheinland Industrial Solutions                    |  | 2007 Esskay Design and Structures Pvt., Ltd.         |
| 328 SKM Industries, Inc.                                     |   |  | 2012 Soitaab USA, Inc.                               |
| 329 Bull Moose Tube Company                                  |   |  | 2024 COMEQ, Inc.                                     |
| 400 ConXtech, Inc.   |   |  | 2025 StruCIM/Predator                                |
| 401 Hilti, Inc.  |   |  | 2112 Combilift USA                                   |



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## new products



### KINETIC K5600XMC

The new K5600xmc combination machine, based on the K5000xmc and featuring pass-through table technology, enables plate to be cut and drilled and drops finished parts down a chute for removal via a motorized conveyor. Featuring a 48-hp spindle, an automatic tool changer with a 24-tool magazine, automatic tool measurement and hardened helical rack for the absolute best positioning, its capabilities include drilling to 4 in. in diameter, thread milling, helical interpolation, plasma and oxy bevel cutting and pin and stamp marking. The machine can process 10-ft by 40-ft plates up to 6 in. thick, with automated part removal. It includes high-pressure through-spindle coolant, ensuring longer tool life and faster processing speeds, as well as fume extraction and Kinetic's patented coolant and chip removal system for automated cleaning.

For more information, visit [www.kineticusa.com](http://www.kineticusa.com) or call 800.606.2954.

### FABSUITE VERSION 16

FabSuite is a comprehensive set of software modules designed specifically for the steel fabrication industry, providing a systematic approach to managing fabrication projects and dramatically improving efficiency, productivity and profitability. The newest release, Version 16, provides enhancements in the areas of estimating, automation of events and reports and advanced data-filtering capabilities. These new features address specific requests from current FabSuite users as well as requests from fabricators evaluating FabSuite as a replacement for other systems. A free demo is available.

For more information, visit [www.fabsuite.com](http://www.fabsuite.com) or call 757.645.0842.



### CONTROLLED AUTOMATION TEE STRAIGHTENER

The TS-WT7×37 tee straightener provides a quick and easy pass-through method of taking out the bow in tees up to  $\frac{7}{16}$  in. thick, at any length and with a maximum tee capacity of WT7×37. This machine is very easy to set up and does the work in minutes. All automation is mechanically driven, with no software or CNC controls required. Whether making profiles with shears, plasma cutting or oxy-fuel cutting, having tees straight is an important requirement for steel fabricators. The TS-WT7×37 will take care of any warp, camber or skew in your tees quickly and easily.

For more information, visit [www.controlledautomation.com](http://www.controlledautomation.com) or call 501.557.5109.



## NASCC

### Watch NASCC Sessions from the Comfort of your Office

From truss design to new approaches to fire engineering, NASCC Live offers you the opportunity to watch selected sessions from this year's NASCC: The Steel Conference live from your own office or conference room from April 13-15.

This year, 24 sessions will be streamed during 12 time slots. You have the option of watching as many sessions as

you want—and you can receive up to 16 PDHs (1.6 CEUs). The cost for the first person from your firm to register is \$225 (for AISC members; nonmembers pay \$350), with each additional registrant from your firm costing just \$10 each.

To view or register for the streaming sessions from NASCC Live, visit [www.aisc.org/NASCCLive](http://www.aisc.org/NASCCLive).

## ACOUSTIC DESIGN

### New Design Guide Addresses Sound Control in Steel Buildings

Building designers have a valuable resource for achieving acoustical conditions suitable for planned occupancies with AISC's new Design Guide 30: *Sound Isolation and Noise Control in Steel Buildings*. The publication provides detailed guidance on how to achieve appropriate acoustical performance for steel-framed buildings, covering topics ranging from estimating noise levels to detailing specific sound-isolating assemblies.

"Design Guide 30 outlines a process for achieving appropriate sound isolation and noise control in buildings," said Benjamin Markham, director of architectural acoustics with ACENTECH and the lead author of the guide. "Issues such as speech privacy, footfall noise, background noise criteria and airborne sound isolation are discussed in detail, with references to industry standards, building codes and other important guidelines."

Whether for an office building, a residential tower, a school or a courthouse, the guide is aimed to provide the building design team with a road map

to developing building details that accomplish appropriate sound isolation and noise control efficiently and economically, beginning early in the design process.

"The principles described in the guide largely apply to all buildings, but the focus of Design Guide 30 is on steel structures," added Markham. "It may be surprising to some that a well-designed floor/ceiling assembly in a steel building can achieve equal or better sound isolation performance than a comparatively heavier concrete structure, depending on the components and how they are assembled."

This new design guide is available as a free PDF to AISC members (\$60 for nonmembers) at [www.aisc.org/dg](http://www.aisc.org/dg). A printed copy is also available via that link or by calling 800.644.2400 (product code: AISC 830-15); the cost of the printed copy is \$40 for members and \$80 for nonmembers. (For more on Design Guide 30, see "Sound Judgment" in the February issue at [www.modernsteel.com](http://www.modernsteel.com).)

## BRIDGES

### MoDOT Gives Away Bridges

The Missouri Department of Transportation (MoDOT) currently has seven historic bridges (all of which are steel) that are available for reuse or relocation. Recipients must agree to preserve the bridge and the features that give it historic significance—and also accept future legal

and financial responsibility for it. To assist in the relocation of a bridge, up to 80% of the costs that would have been spent to demolish the bridge may be available to reimburse the new owners for its reuse. Visit [www.modot.org/freebridges](http://www.modot.org/freebridges) for more information.

## People and Firms

- **AZZ, Inc.** (an AISC member galvanizer) recently announced that it has acquired the assets of Alpha Galvanizing Inc., an Atkinson, Neb.-based business unit of Olson Industries, Inc. The newly acquired Nebraska plant is located on a 12-acre site with a 19,500-sq.-ft operating facility with a 46 ft by 6 ft by 8 ft kettle. It will operate as AZZ Galvanizing-Nebraska and will complement AZZ's Midwestern locations in Minnesota and Denver. You can take a photo tour of AZZ's Goodyear, Ariz., plant in "Galvanizing Illustrated" in our August 2014 issue, available at [www.modernsteel.com](http://www.modernsteel.com).
- **CoreBrace, LLC**, a wholly owned subsidiary of **SME Industries, Inc.**, recently announced its purchase of **Star Seismic** in Park City, Utah. The companies (both AISC Members) engineer and fabricate buckling restrained braces (BRBs) for the purpose of protecting buildings against earthquake-related stresses. All current Star Seismic projects will be completed by the new entity, CoreBrace, LLC, and both companies will operate under that name.
- **SCIA**, a maker of structural design software and member of the **Nemetschek Group**, has announced the appointment of Mrs. Hilde Sevens to its board of directors as CEO. She succeeds former CEO and company founder, **Mr. Jean-Pierre Rammant**, who recently retired.



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## news

### SCHOLARSHIPS

## AISC Accepting Applications for 2016-17 Scholarships

Full-time juniors, seniors and masters students enrolled in civil engineering, architectural engineering, construction engineering or construction management programs at U.S. universities are encouraged to apply for AISC scholarships for the 2016-17 academic year. A total of

\$104,000, provided by the AISC Education Foundation and various steel industry organizations, will be awarded to students.

To see the full eligibility requirements and online application, visit [www.aisc.org/scholarships](http://www.aisc.org/scholarships). Applications will be accepted until May 1.

### CODES AND STANDARDS

## 2016 AISC Code Available for Public Review

A draft of the 2016 AISC *Code of Standard Practice for Steel Buildings and Bridges* is available for public review from April 1 until May 16. This is an update of the 2010 version of the *Code*.

The draft is available at [www.aisc.org/publicreview](http://www.aisc.org/publicreview) along with the review form. Hard copies are also available (for a \$35 charge) by calling 312.670.5411.

Please submit comments via the review form to Janet Cummins ([cummins@aisc.org](mailto:cummins@aisc.org)) by May 16 for consideration.

### NASCC

## New Bridge Documentary Premieres at WSBS

The world premiere of a new documentary on one of America's greatest bridge designers will be held during this year's World Steel Bridge Symposium (WSBS)—held in conjunction with the 2016 NASCC: The Steel Conference—April 13-15 in Orlando.

*Bridging Urban America* tells the story of Ralph Modjeski, the designer of some of the 20th century's most significant bridges, including the Ben Franklin Bridge in Philadelphia, the Bay Bridge in San Francisco/Oakland, the Huey P. Long Bridge in New Orleans and the Quebec Bridge in Canada. The film not only offers awe-inspiring views of these magnificent structures but also tells the story about Modjeski's role as an engineer, entrepreneur, artist and innovator. It also highlights important steel bridges that are still in service today and that will remain critical parts of North America's infrastructure for many years to come.

Highlights of the film will be featured during the WSBS opening keynote at 8:00 a.m. on Wednesday, April 13, and the entire film will be shown at 7:45 p.m. that day. Entry to the screening is free to all of the 4,000 expected conference attendees; others interested in attending should email Sadie Brown at [brown@aisc.org](mailto:brown@aisc.org). For more information on the film and to view a trailer, visit [bridginguamericafilm.com](http://bridginguamericafilm.com).

NASCC and WSBS offer more than 150 technical sessions of steel bridge and building design and construction and around 200 exhibitors showcasing the latest software and tools. For more information or to register for The Steel Conference, please visit [www.aisc.org/nascc](http://www.aisc.org/nascc).

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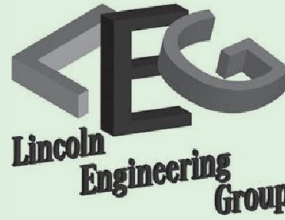
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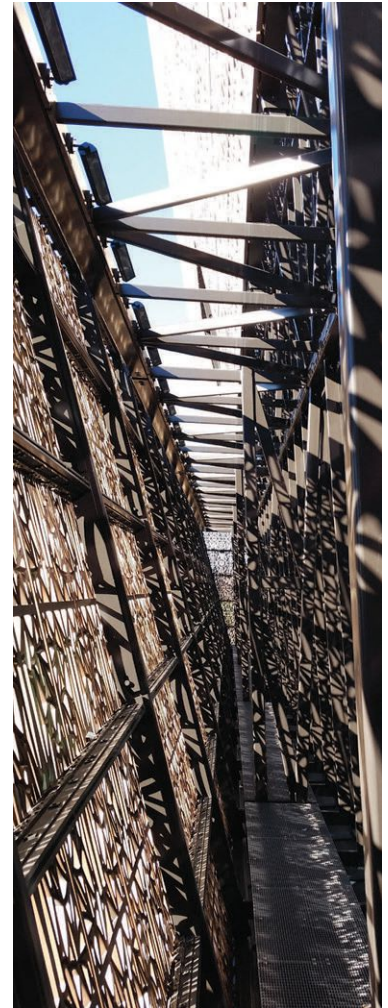
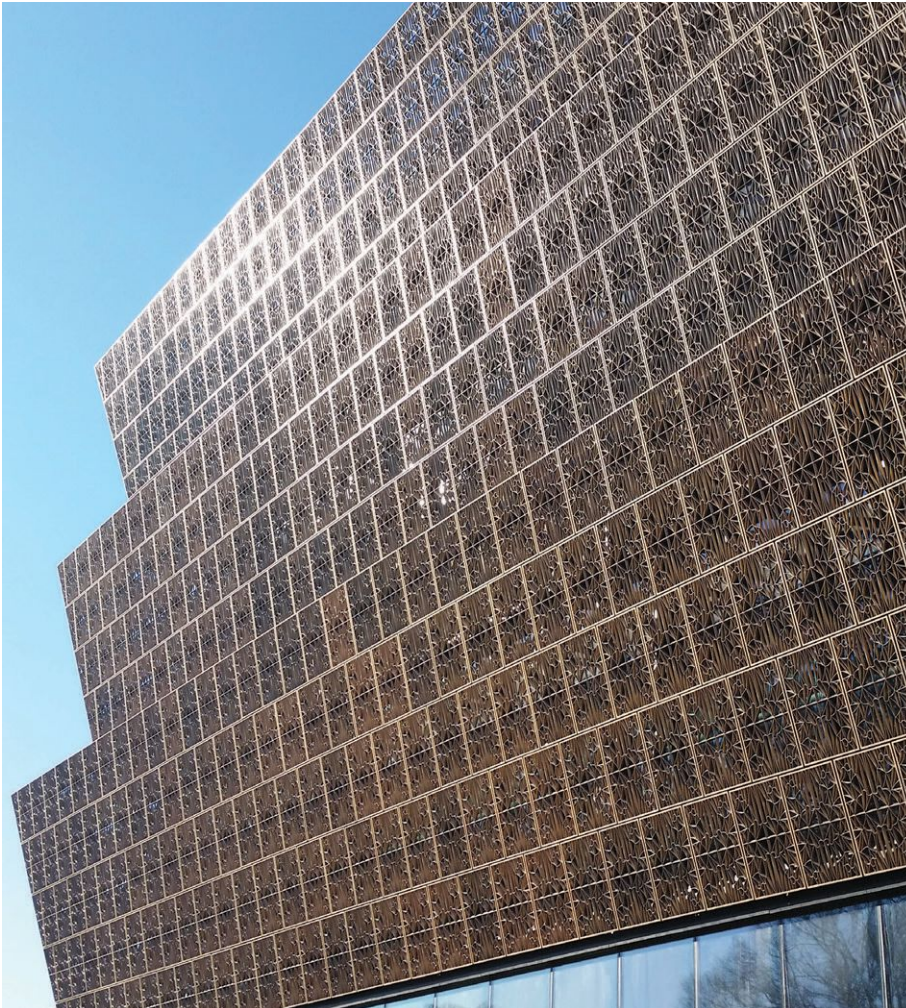
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## ON THE MALL



### **THE NEWEST SMITHSONIAN INSTITUTION BUILDING** might be the last of its kind.

The 400,000-sq.-ft. Smithsonian National Museum of African American History and Culture (NMAAHC) is situated at the center of the National Mall, near the Washington Monument, in Washington, D.C., and will house exhibition space for U.S. African American history and culture, as well as host ceremonies and performances. It may also be the last Smithsonian Museum to be constructed on the Mall itself, as it occupies the last available space set aside for museums.

SteelFab, Inc. (an AISC Member/Certified fabricator) fabricated 4,050 tons of structural steel for the museum, and Bosworth Steel (an AISC Member/Certified erector) erected roughly 75% of the project's structural steel. The building has no perimeter columns, and the cantilevered floor levels are suspended from the large gallery roof. A grand, long-span "porch" at the south entry point (using 200 tons of steel) represents a common gathering place of the American South and consists of another cantilevered structure supported by two super-columns. Architects for the project include Adjaye Associates, Davis Brody Bond, The Freelon Group and SmithGroup JJR, with Silman Associates as the structural engineer.

Referring to the striking shape of the building, collaborating architect David Adjaye says, "The form of the building suggests a very upward mobility. And when you look at the way the circulation works, everything lifts you up into the light. This is not a story about past trauma. For me, the story is one that's extremely uplifting as a kind of world story."

Adjaye notes that structural steel supports the building's façade, which is made up of 3,600 painted alloy panels that feature an African textile pattern. The bronze color reflects the African-American guilds of casting and ironworking that emerged in the South after the Civil War. The museum is scheduled to open this year. For more about the project, including a live construction webcam, visit [nmaahc.si.edu](http://nmaahc.si.edu).





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A circular diagram with a dashed outer ring and a solid inner ring. The inner ring is divided into segments, each containing a white icon: a cube, a magnifying glass, a cloud with an upward arrow, a group of people, a globe, an envelope, an '@' symbol, and two interlocking gears. The outer ring contains icons for a smartphone, a tablet, the Autodesk logo, a laptop, and a gear. A hand is visible at the bottom, with a finger pointing towards the center of the diagram.

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