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ON THE COVER: A new bridge in Kentucky is the final link in a key Appalachian highway corridor, p. 30. (Photo: Chris Poynter, Stupp Bridge)
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Sadly, the answer, as is the case with most of our trips back to Colorado for the holidays in recent years, is no.

We used to live in Colorado (we’ve been in Chicago since 2002) and hit the slopes quite a bit back in the days before kids and a mortgage. Lift tickets were expensive then, and they haven’t gotten cheaper. Traffic to the ski resorts was bad then, and it definitely hasn’t gotten any better. With all the chaos of the holidays and trying to fit in visits with family and friends, skiing just became less of a priority. (And for the record, I wish people would ask if I snowboarded instead, since that’s my preferred method of getting down the mountain. But alas).

That said, we took a short trip to the mountains on this visit. We headed up to Winter Park to go tubing—the kind where you ride inner tubes down a hill like a sled. The first place we tried was so crowded and expensive that we decided to head further down the road to a place my wife and her brother went as kids. For the same price as the other spot, you got four hours instead of one, and ice skating was included.

The skating is worth mentioning because, 1) I grew up in Texas and had ice skated exactly once in my life before this trip (almost 30 years ago, and it didn’t go well), 2) I made a last-second decision to face my fear, put on a pair of skates, and venture onto the rink, and 3) miraculously, I didn’t fall! I was no Kristi Yamaguchi, but I got around the rink a few times, built up some confidence, and actually left wanting to try it again sometime. Overall, we had a blast for a relative bargain.

What else is a relative bargain (and a blast as far as trade shows go)? NASCC: The Steel Conference. For one low price, you gain access to more than 250 sessions of must-have practical information you can implement as soon as you get home, an exhibit hall packed with more than 300 innovations you need to know about right now, and a chance to network with thousands of the world’s best designers, fabricators, erectors, and other steel fans.

You can also attend several engaging keynote sessions. Some of this year’s speakers are expert Chad Hymas, who will offer advice on how to build an environment where everyone has safety on their minds; Northeastern University professor Jerome F. Hajjar, PhD, who will take a deep dive into one of the hottest topics in the design and construction industry during his presentation “The Stability of Resilient and Sustainable Structures”; David Odeh, SE, PE, who will share his thoughts on the upcoming film Cities of the Future: Reimagining Our World during a screening of the film’s trailer; and Benjamin W. Schafer, PE, PhD, the 2024 T.R. Higgins Lectureship Award winner and the Hackerman Professor of Civil and Systems Engineering at Johns Hopkins University, whose presentation “Think Global, Buckle Local: Exploring Local Buckling in Structural Steel” will focus on the role of local plate buckling in the global behavior of structural steel members.

This year’s show takes place in San Antonio, Texas, from March 20–22. You can register now at aisc.org/nascc. There will be plenty of opportunities to learn new things or learn new ways to do old things—just like I did with ice skating.

We went to Colorado for the holidays, and whenever you tell people you went to Colorado in the winter, the first question they ask, almost invariably, is, “Did you ski?”
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Space Rocket Loading

I’m working on a project where I’m designing a storage building adjacent to a launch pad for a space rocket. Our client is anticipating a certain pressure to be applied to the storage building. We are planning on using steel framing for the gravity and lateral systems. Does AISC provide any guidance on this kind of building design?

Rocket launch facilities are highly specialized, and there are no publications developed by AISC (or any other publisher that I am aware of) that discuss the design of these structures. Structures in the blast zone are subjected to high pressures and temperatures. The owner should provide pressure and temperature maps for launch conditions. These are specific to the rocket and have been developed for past structures based on computer models, empirical measurements and/or judgment.

For the subjected to high pressures, the structures can often be similar to ships, with steel plate decks stiffened by closely spaced rolled shapes or plates. For any areas that are subjected to more moderate temperatures and pressures, the framing can be designed similar to any other industrial structure, but with smaller girt/purlin spacings and stronger siding/roofing panels.

You may be interested Mission to Mars—Construction of the ML2 Mobile Launch Tower, a session at 2024 NASCC: The Steel Conference March 20–22 in San Antonio, Texas.

Bo Dowswell, PE, PhD

Corner Clip Dimensions

What dimensions are typically used for the corner clips of stiffeners and continuity plates attached to the flanges and webs of rolled members?

Many U.S. fabricators primarily use ¾-in. (19 mm) corner clips. They will use 1-in. (25 mm) corner clips where the ¾-in. corner clips prove to be too small. Corner clips are commonly configured as a 45° cut. Part 8 of the Manual states, “Corners of stiffeners and similar elements that fit into a corner should be clipped generously to avoid the lack of fusion that would likely result in that corner. In general, a ¾-in. clip will be adequate, although this dimension can be adjusted to suit conditions, such as when the fillet radius is larger or smaller than that for which a ¾-in. clip is appropriate.”

For seismic applications (specifically for connections and joints that are part of the Seismic Force Resisting System), Section D2.4 in AISC Seismic Provisions for Structural Steel Buildings states, “The design of continuity plates and stiffeners located in the webs of rolled shapes shall allow for the reduced contact lengths to the member flanges and web based on the corner clip sizes in Section I2.4.”

Section I2.4 states, “Corner of continuity plates and stiffeners placed in the webs of rolled shapes shall be detailed in accordance with AWS D1.8/D1.8M, clause 4.1.” AWS D1.8 requires a minimum ½-in. (12 mm) radius. Clause 4.1 of AWS D1.8 provides other requirements that must be satisfied.

Slotted-Holes in Single-Plate Connections

When using Table 10-9 in the 16th Edition Steel Construction Manual, the section titled Dimensional Limitations states, “Standard holes (STD) or short-slotted holes transverse to the direction of the supported member reaction (SSLT) are permitted to be used as noted in Table 10-9.” Specification for Structural Steel Buildings (ANSI/AISC 360-22) Section J3.3 states that bolted connections may have short-slotted holes in both plies. Would this permit the use of short-slotted holes in the single-plate and in the beam web to gain additional erection tolerances?

The intent of the procedures in Part 10 of the Manual for single-plate shear connections is that there would only be a short slot in one element—the single plate.

One reason for this is the design of the eccentrically loaded bolt group. It’s common to use Manual Tables 7-6 through 7-13 to determine the strength of eccentrically loaded bolt groups. The underlying procedure, the instantaneous center of rotation method described in the Manual, assumes load-deformation behavior based on bolts in standard holes.

The C-values from the Manual tables can be justified when there is a short slot in one element. The C-values from the Manual tables cannot be justified when there is a long slot. The use of short slots in both plies results in a condition like long slots, and therefore, a condition for which the C-values from the Manual tables cannot be justified.

Chapter J does permit short slots in both plies, so one could theoretically design a single-plate shear connection with short slots in both plies that satisfies the requirements of the Specification, but this would have to be done using some method other than that described in Part 10 of the Manual.

Larry Muir, PE
The commentary provided for the Provisions explains, “The available lengths for welds of continuity plates and stiffeners to the web and flanges of rolled shapes are reduced by the detailing requirements of AWS D1.1/D1.1M, clause 4.1 (AWS, 2021), as specified in Section I.2.4 of the Provisions. See Figures C-D2.3(a) and (b). These large corner clips are necessary to avoid welding into the k-area of wide-flange shapes.”

![Fig. C-D2.3. Configuration of continuity plates.](image)

**Larry Muir, PE**

**Change in \( t_p \) equation in AISC Design Guide 39**

In Design Guide 16: Flush and Extended Multiple-Row Moment End-Plate Connections, \( \gamma_r \) is located in the numerator for the \( t_{p,\text{reqd}} \) calculation, yet in Design Guide 39: End-Plate Moment Connections it is in the denominator. Why has this changed?

\[
\begin{align*}
\gamma_r \phi = \frac{\gamma_r \phi M_{up}}{\phi b F_{py} Y_p} \\
\gamma_r \phi = \sqrt{\frac{M_{up}}{\gamma_r \phi b F_{py} Y_p}}
\end{align*}
\]

(2-7)  

(5-5a)

This change better reflects the fact that \( \gamma_r \) is a reduction of the flexural strength so that the flush end-plate connections remain fully rigid. In Design Guide 39, Eq. 5-1, you will find that \( \gamma_r \) is now either 0.80 for flush end-plate configurations or 1.0 for extended end-plate configurations, whereas it was previously defined as 1.25 for flush end-plate configurations or 1.0 for extended end-plate configurations in Design Guide 16. The following excerpt from Design Guide 39 Section 3.2 gives the basis for the \( \gamma_r \) factor and notes the equivalence of multiplying by 0.80 in Design Guide 39 to dividing by 1.25 in Design Guide 16:

“To determine whether end-plate moment connections are FR [fully restrained] or PR [partially restrained] type connections, it is necessary to analyze their stiffness. Hendrick et al. (1985) evaluated the stiffness of approximately 20 flush end-plate connections and found that the moment-rotation curves crossed the beam line at an average of 83% of the values required to be considered FR.

Another way to look at this result is that the connections were stiff enough to be considered FR up to a moment equal to 83% of the end-plate flexural strength. Hendrick et al., therefore, recommended that the end-plate design flexural strength be reduced by 0.80 (slightly reduced from 83% because of variability in results) so the connection would behave as FR when subjected to factored loads.

“This shows up in the end-plate design procedures as a reduction factor of \( \gamma_r = 0.80 \) applied to the flexural strength associated with end-plate flexural yielding for flush end-plate connections. It is noted that this reduction factor is equivalent to dividing by 1.25, which was used in the previous edition of this Design Guide.”

*Michael Desch, PhD*

**Compression Ring Design**

Does AISC provide guidance on how to design a curved member compression ring?

Curved members can be designed according to AISC Design Guide 33: Curved Member Design, which can be downloaded from the AISC website at aiscc.org/dg. Chapter 6 provides information on members with axial compression in the plane of curvature. As discussed in Section 6.1, Design Guide 33 uses an equivalent straight column approach, where effective length factors are presented for arches. The design guide does not provide information for the in-plane buckling of rings; therefore, an effective length factor must be derived from the available equations.

Equations for the elastic critical load for the in-plane buckling of rings can be found in several publications on stability, including Theory of Elastic Stability (1961) and Fundamentals of Structural Stability. The in-plane buckling strength is dependent on the loading condition. The lowest buckling load is for the case where the load remains normal to the buckled shape during buckling, which occurs when a pressure load is applied around the perimeter.

The buckling force for this condition is \( P_{cr} = 3EI_c / R^2 \). The critical force for elastic buckling about the strong axis of a straight column is \( P_c = \pi^2 EI_c / (KL)^2 \). Setting \( P_{cr} \) equal to \( P_c \) and solving for the effective length results in \( L_c = KL = 1.81R \). \( R \) is the ring radius and the remaining variables are as defined in the Specification.

Chapter 6 of Design Guide 33 also provides information on the interaction of the axial force with the other internal loads in the member, including second-order effects.

*Bo Dowswell, PE, PhD*
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Across
3 Method to design a weld loaded eccentrically normal to the plane of the faying surface that involves calculating an equivalent normal force
6 Allowable variation from specified values for material, fabrication, and erection
10 Colloquial name for a single-plate connection; a ____ tab
11 Sudden, brittle failure that occurs by cleavage at a stress level below the yield strength
13 Curvature fabricated into a beam or truss
18 Standard the Manual is based on
21 Term used to describe forces local to the gusset region of a V-, inverted V-, or X-type braced frame
22 Cutout made in a structural member to remove a flange
23 Accelerated corrosion due to significant potential difference between two different materials
24 Mathematical term for determining a value between two other known values, which should be used with caution in the Manual tables

Down
1 OSHA-required minimum number of anchor rods for a column base plate
2 Type of tearing involving separation in highly restrained base metal caused by through-thickness strains induced by shrinkage of adjacent weld metal
4 AISC designation of a material specification that is commonly used in steel construction and reflects factors like ready availability, ease of ordering and delivery, and pricing (hint: indicated by black shading in Table 2-4,-5,-6)
5 Partially restrained and fully restrained ____ connections are combined in the Part 11 of the 16th edition
7 Transverse center-to-center spacing of fasteners
8 Gage for fasteners in the flange that provides for entering and tightening clearances, edge distance, and spacing requirements
9 210 new sizes of these shapes are in the 16th edition
12 Width of a ____ section determined by spreading the force from the start of a joint 30° to each side in the connecting element
14 Combination of structural elements and joints used to transmit forces between two or more members
15 A bolt that cannot see
16 Person the 16th edition is dedicated to; developed the uniform force method
17 Plate at column bottom
19 Small connection angle
20 Phenomenon that occurs in bolted joints with tensile bolt forces
22 Shape with a slope of approximately 2 on 12 on the inner flange surface
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Across
3 Plastic
6 Tolerance
10 Shear
11 Fracture
13 Camber
18 Specification
21 Chevron
22 Cope
23 Galvanic
24 Interpolation

Down
1 Four
2 Lamellar
4 Preferred
5 Moment
7 Gage
8 Workable
9 HSS
12 Whitmore
14 Connection
15 Blind
16 Thornton
17 Base
19 Clip
20 Prying
22 Channel

Across
3 Plastic
6 Tolerance
10 Shear
11 Fracture
13 Camber
18 Specification
21 Chevron
22 Cope
23 Galvanic
24 Interpolation

Down
1 Four
2 Lamellar
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Beam stability in industrial structures requires careful consideration of unique conditions during the design process.

**ALTHOUGH MANY** industrial structures are similar to buildings—and the AISC Specification for Structural Buildings (ANSI/AISC 360-22) applies to them—their unique characteristics can affect the member strength and stability.

*Specification* Section A1 defines other structures—and by extension, industrial structures—as “structures designed, fabricated, and erected similarly to buildings, with building-like vertical and lateral load-resisting elements.” Industrial structures have design constraints based on functionality, and the buckling strength of their flexural members is affected by the loading, bracing, and boundary conditions.

Loading, bracing, and boundary conditions can be unique in industrial structures. And because the *Specification* applies to buildings and building-like structures, engineers should weigh the effect of these special conditions in the design process for industrial structures. There are several important areas to consider.

**Boundary Conditions and Simple Shear Connections**

Let’s start with boundary conditions at beam ends, which are determined before the analysis. For example, pinned supports are assumed at both ends when designing a simple beam, as shown in Figure 1. These supports, which define the boundary conditions for flexure, prevent vertical translation and allow rotation. The boundary conditions for lateral-torsional buckling (LTB) should also be considered for unbraced beams.

The lateral-torsional buckling equations in *Specification* Chapter F were derived assuming a rigid torsional (twisting) restraint at each end of the unbraced length, as stated in *Specification* Section F1(b): “The provisions in this chapter are based on the assumption that points of support for beams and girders are restrained against rotation about their longitudinal axis.”

The proper LTB boundary conditions are often idealized as fork supports, preventing vertical translation, lateral (out-of-plane) translation, and twisting. Many simple shear connections have adequate torsional resistance to meet the requirement in *Specification* Section F1(b). The 16th Edition *Steel Construction Manual* (Part 10, page 10-8) recommends that the minimum length of simple shear-framed connections be one-half of the T-dimension of the supported beam.

Satisfying that recommendation results in a reasonable level of torsional resistance for most connections. However, special considerations are often required when beam connections provide ambiguous torsional resistance, such as with unframed ends and coped beams.

The most common simple shear connections for heavy industrial structures are double-angle connections, shown in Figure 2a. The torsional resistance of these connections is usually deemed adequate without further consideration. Similar torsional resistance is provided by shear end-plate connections (Figure 2b), which are sometimes preferred for galvanized beams because the amount of seal welding is reduced. Also, for shops that use robotic welding, end plates may be preferred over clip angles due to the increased welding clearances at the end plates.
Floor and Roof Systems

Many buildings have floor and roof systems that can also provide top flange lateral panel bracing for beam stability. However, the primary purpose of many industrial structures is to support the loads associated with a process. These structures are often exposed to weather and do not have floors or roofs. Where floors and roofs are present, differences in floor/roof systems between buildings and industrial structures can affect the LTB strength of beams.

For some industrial structures, an entire framing level can support a floor system. When a floor is not required, access to machinery and equipment is typically provided by walkways and platforms located on only a portion of the framing level area. In many cases, entire framing levels are “bare,” indicating that only the structural steel framing is present without a floor, walkway, or platform.

Metal bar grating is usually used for floors, walkways, and platforms of exposed industrial structures. Because grating panels have limited in-plane shear resistance, grating is usually deemed ineffective for lateral panel bracing. Additional practical considerations typically lead to the limited bracing effect of grating:

- Grating panels are sometimes removed permanently during a retrofit or temporarily for access (for example, to install equipment)
- Grating-to-beam connections can be compromised by corrosion or fracture (caused by thermal stresses, vibration fatigue, and impact)
- The engineer may not have complete control over the installation process and may not be informed if the grating-to-beam connection is changed from directly welded to saddle clips

The lack of top flange lateral panel bracing at many beams in industrial structures has an obvious effect on the unbraced length, $L_b$. Another factor resulting from the lack of lateral bracing at the beam ends is the potential effect on the torsional restraints.

Unframed Ends

To satisfy the boundary conditions assumed in Specification Chapter F, Specification Section J10.7 requires “At unframed ends of beams and girders not otherwise restrained against rotation about their longitudinal axis, a pair of transverse stiffeners, extending the full depth of the web, shall be provided.”

The Specification glossary defines an unframed end as “the end of a member not restrained against rotation by stiffeners or connection elements,” where the implied rotational restraint is about the beam longitudinal axis. When proper torsional restraint is not provided at the unframed ends of unbraced beams, web distortion can reduce the beam buckling strength. This web bending distortion for a seated beam is shown in Figure 3.

For beams supported on bearing plates, restraining methods are discussed in Manual Part 2, pages 2-18 and 2-19. Restraint at stiffened and unstiffened seated connections is provided by supplementary angles connected to the beam top flange or the beam web, as shown in Manual Part 9. Various conditions in some industrial and nonbuilding structures require special consideration.

Fig. 3. Web distortion of a seated beam without proper torsional restraint at the ends.

Seated crane girders have lateral crane loads that must be transferred from the top flange of the girder into a supporting member. Tiebacks are designed to transfer these lateral forces into the column. Figure 4—from AISC Design Guide 7: Industrial Building Design (Third Edition)—shows a typical tieback. Tiebacks also function as top flange stability bracing to satisfy the boundary conditions assumed in Specification Chapter F.

Fig. 4. Typical crane girder tieback.
Providing torsional restraints at the ends of unbraced spans is impractical for some seated beams in industrial and nonbuilding structures. That issue can occur when the support location varies based on field conditions, such as framing around roof openings and temporary supports.

In these cases, where the beams are designed with unframed ends, the LTB strength can be reduced by increasing the effective length according to Structural Use of Steelwork in Buildings (British Standard 5950). The equations in Specification Chapter F can be used with an effective unbraced length equal to $L_{ub} + 2d$, where $d$ is the beam depth.

A similar condition exists at underhung monorail beams, where the beam top flange is connected to support beams, as shown in Figure 5a. The potential web bending distortion is shown in Figure 5b. Because the trolley runs along the bottom flange, both transverse web stiffeners and a bottom flange lateral brace will interfere with the trolley passage. Therefore, these beams are designed with unframed ends, and the effective unbraced length method discussed in the preceding paragraph is applicable.

**Coped Beams**

Beams are often coped to allow framing at the same top of steel elevation as the supporting beam. Where practical, the depth of the supporting beam should be greater than that of the supported beam. That allows the use of single-coped beams, which are shown in Figures 6 and 7a. Double-coped beams (Figure 7b) are required when the supporting beam depth is approximately the same as the supported beam depth. Compared to double-coped beams with similar geometry, single-coped beams have greater local cope strength (see Manual Part 9) and greater LTB strength. They are also more economical to fabricate.

For beams without lateral bracing near the cope, the local cope strength (see Manual Part 9 pages 9-7 through 9-10) and the LTB strength of the beam are interdependent. Because the torsional restraint depends on the cope geometry,
the boundary conditions assumed in Specification Chapter F may not be satisfied for unbraced beams with large cope dimensions. This condition is briefly discussed on Manual page 9-10, which references two journal papers that contain the appropriate design equations.

For common cope geometries, the effect on the LTB strength is usually negligible. However, special conditions can require an increase in the cope dimensions, causing a significant reduction in the LTB strength. Round process equipment such as bins, silos, and large industrial ductwork is often supported on skewed beams located around the perimeter of the equipment. That increases the cope length, as shown in Figure 8.

Fig. 8. Skewed beam connection.
Uncommon cope geometries are also required when beams frame into heavy members, as shown in Figure 9. This condition can occur when beams frame to heavy truss chords and where unconventional beams are used to satisfy geometric constraints such as clearances for headroom and machinery maintenance or removal. Although unusual, the member size on retrofit projects can be limited by the clearance in a congested area of a plant, causing small cross-sectional dimensions with thick elements.

Figure 10 shows a design example from Session 6 of AISC Night School 31: Beam Design and Stability, where the available strength of an unbraced W16x26 beam with large double copes at each end was calculated. The beam and cope geometry was modeled using plate/shell finite elements using IDEA StatiCa software. A critical load analysis resulted in a buckled shape for Mode 1, which is shown in Figure 11, where twisting in the coped region was observed. Compared to a similar non-coped beam, the critical load analysis resulted in a 25% reduction in the lateral-torsional buckling moment due to the copes.

The effect on the LTB strength is usually negligible for common cope geometries. With the large cope dimensions and thin beam web, this design example does not represent common practice for industrial structures. The geometry was selected to show a significant reduction in the LTB strength.

The author will host a session titled “What Designers Need to Know About Beam Stability for Industrial Structures” March 21 at 2024 NASCC: The Steel Conference in San Antonio, Texas.

**Fig. 9.** Double-coped beam framing into a large member.

**Fig. 10.** Design example from AISC Night School 31.

**Fig. 11.** Mode 1 buckled shape from the IDEA StatiCa finite element model.

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**Bo Dowswell**

(bodowswell@arcstructural.com) is a principal with ARC International.
**Valiant + Katana**

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www.ficepcorp.com
Rob Connor has helped make Purdue University a leader in steel bridge research.

What got you into the world of engineering?

I did my undergraduate work at Drexel University in Philadelphia, and I’m from the coal mining region of Northeastern Pennsylvania. I started as an electrical engineer because I naively thought it involved lighting and wiring. I liked working with my hands. But it was mainly ones and zeros, which wasn’t my thing.

Then I took a class called statics, where I first learned about forces. The professor said if you go outside the building after class, there’s a railroad bridge—look at it, and you’ll see the pins and rollers we discussed in class. I went out, saw a train going over it, and thought, “I can see that and relate to that.” That week, I switched to civil engineering and focused on structural

STUDYING AND TESTING bridge fatigue has made Rob Connor anything but tired.

Connor, the Jack and Kay Hockema professor in the Lyles School of Civil Engineering at Purdue University, won a 2023 AISC Lifetime Achievement Award and the 2018 T.R. Higgins Lectureship Award for his significant contributions to advancing design in steel bridge fatigue, fracture, and other performance issues. He’s also the director of two cutting-edge Purdue engineering facilities: The Center for Aging Infrastructure (CAI) and the Steel Bridge Research Inspection Training and Education Center (S-BRITE).

Connor’s research interests have focused on fatigue and fracture, field testing and remote monitoring of structures, nondestructive testing, large-scale structural testing in real time, and redundancy, among other areas. He has helped grow S-BRITE into a nationally acclaimed training and test center that obtains decommissioned bridges from around the country.

Connor spoke with Modern Steel Construction about his career, research projects, S-BRITE, and more.

Field Notes is Modern Steel Construction’s podcast series, where we interview people from all corners of the structural steel industry with interesting stories to tell. Listen in at modernsteel.com/podcasts.
redundancy or perceived redundancy would probably collapse if one component fails. If you think about an airplane, the landing gear is fracture-critical. If it fractures due to a fatigue crack, that’s a bad day. If a pilot said, “Welcome to the fracture-critical aircraft,” you’d probably get off. But we called certain highway bridges that. It’s not an attractive term.

Fracture-critical bridges are subjected to special requirements in fabrication and design. However, the big issue is the long-term in-service inspection. The required in-service arm’s length fatigue inspection every two years is expensive and risky for the inspectors because they must get up close to the bridge. You’re closing lanes, causing traffic backups, and risking traffic incidents.

My 2018 T.R. Higgins lecture tried to rationalize that rather than putting a finger to the wind regarding how to manage steel structures that are deemed to have nonredundant members. Instead, we could take an integrated approach to ensuring reliable long-term performance.

After more than a decade of research, the work resulted in codified approaches that were incorporated into two AASHTO Guide Specifications. These Specifications allow engineers to evaluate a member traditionally classified as a fracture critical member and determine the consequence of member or component failure. Depending on the outcome of the analysis, various in-service inspection strategies that are tailored to the member can then be employed.

AASHTO approved these documents in 2018. However, the federal laws governing bridge inspection needed to catch up to allow full implementation. When the new Code of Federal Regulations came out in June 2022, the industry could fully implement the AASHTO Guide Specifications, and that’s a game-changer for the steel bridge industry. We can now treat these members more rationally. We can use efficient designs, such as twin tub girders or trusses, and explicitly consider redundancy. We don’t have to worry about the consequence of a member failing because we do the analyses to verify various failed member scenarios. The analysis also identifies the truly critical members, should they fail, thereby giving owners an engineering-based reason to focus inspection efforts on the components with the most risk.

engineering. That little thing changed my direction in engineering.

Were you in the design world for a while first, or did you go straight into teaching?

I graduated from Drexel in 1990 and started work with a company called Greiner Engineering, which has since been bought and absorbed into other companies. I took a job there because they had great experience in bigger bridges. I was also taking graduate classes part-time. I worked for about four years doing bridge inspection and design in the Philadelphia area.

How did you get to Purdue?

That’s a long path. I went to Lehigh University for my grad work in 1994 because I wanted to know more about fatigue and fracture. I did my master’s and PhD there, then stayed as a research engineer. I loved the work there. It was a great learning atmosphere, especially in fatigue and fracture. But I wanted to have a little more involvement with students.

An opportunity arose at Purdue University, which had just built a gigantic structural engineering lab. I joke that it still had “the new lab smell” when I arrived. That was back in 2005. I was fortunate enough to get hired, and I’ve been there since.

Amit Varma, a good friend from my PhD days at Lehigh, had also started at Purdue about a year earlier. He’s also a Higgins Award winner. Mark Bowman and Judy Liu, other researchers I knew, were also there. It had a good base of steel people.

What was your first big research project?

That was when I was still at Lehigh—my first National Cooperative Highway Research Program (NCHRP) project. It was on heat straightening of girders and the effect on their fatigue and fracture performance. That led to many other NCHRP projects that probably put all the gray hair on my head. But that was the first big one.

At Purdue, we’ve been very fortunate to land some great projects. I can’t pick a single project, but I have a theme I’ve worked on for 10 to 15 years: trying to rationalize the topic of the fracture-critical member. That has been a career-long focus through multiple projects examining inspection, inspection reliability, and behavior system analysis for big fracture tests. I’ve enjoyed that theme, and it started at Purdue.

What is the significance of the terminology change from fracture-critical members to non-redundant steel tension members?

It’s a game-changer for the steel bridge industry. Fracture-critical is a terrible term from a public relations perspective. The idea is that a bridge without enough redundancy or perceived redundancy would probably collapse if one component fails. If you think about an airplane, the landing gear is fracture-critical. If it fractures due to a fatigue crack, that’s a bad day. If a pilot said, “Welcome to the fracture-critical aircraft,” you’d probably get off. But we called certain highway bridges that. It’s not an attractive term.

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field notes
HNTB gave a presentation that revealed they’re using the work and incorporating the concepts into their designs. Several state departments of transportation are using it, from what I understand, and the consulting community is also implementing the specifications. It’s neat to see a rational approach to addressing an assumed failure mode come to fruition.

What are some recent and current projects in Purdue’s structural engineering lab?

The lab is bustling. It’s a great facility. The strong floor for testing is about 11,000 sq ft. For scale, we have a 35-ft span railroad bridge with ties and rails in the lab. We’re doing some testing on it. I’m doing small pull plate tests with a student. We also have some big bridge girders with pack out corrosion we are testing. We’re continuing down the path of redundancy or built-up members.

One challenge owners face with older bridges is related to pack-out corrosion, where plates get bent apart. Corrosion gets in between old, riveted members; they bend and look bad. But more research into its actual effect on capacity and fatigue is necessary.

So we acquired some members with real damage from old bridges. We also simulated pack-out damage of our own. We tested these in the lab—long-term fatigue tests, strength tests, cold temperature tests, and followed up with finite element analysis. Then, we did the same thing on the compression portion of the member to see if it would buckle more quickly or lose capacity.

The objective is to determine when this problem needs to be addressed and how we can get guidance into the AASHTO Standard Specification for Highway Bridges. That has been an ongoing one and has been a lot of fun. There is a lot of other large-scale work going on by my colleagues that is great for the students to observe.

Can you describe Purdue’s S-BRITE center and what goes on there?

S-BRITE is about a 20-acre outdoor facility, and we’ve developed about 10 acres that Purdue provided for the facility. (Editor’s note: Read more about S-BRITE in the October 2019 issue of Modern Steel Construction titled “Wanted: Old Steel Bridges”).

I teach several courses in fatigue, and it’s always a challenge to explain to students and professional engineers or inspectors where exactly to look for cracks, what a crack really looks like in service, and other considerations. We also realized many inspectors have negligible or zero firsthand experience spotting cracks, at least when they are new inspectors. Furthermore, new bridges rarely have any issues with fatigue cracking.

To improve the training, I thought it would be neat to keep a few components with damage, whether that’s due to corrosion, fatigue, or impact damage. I pitched it to the Indiana Department of Transportation, and they supported it. The Federal Highway Administration also thought it was a unique idea. As we discussed the concept with others, we found many other state departments of transportation were excited to use out-of-service bridges to improve training.

The main portion of S-BRITE is a training facility where we have four complete bridges and many other components from bridges. As you can imagine, we want damaged members, because we’re trying to train bridge inspectors and designers to detect damage, identify problem details, and observe retrofits firsthand. It also helps with undergraduate and graduate steel classes where the professor is trying to explain steel details, such as very large-bolted joints. We have the largest collection of components from the Interstate 35W bridge in Minneapolis that collapsed in 2007.

It’s an incredibly unique facility and allows some great collaborative research opportunities. For example, if someone is interested in using drones for inspection, we have bridges with damage, but we don’t have to worry about worker fall protection, traffic control, or risk to the public because it’s in a controlled environment.

Another big part is our outreach of professional training, where we help DOTs with problems and provide training to their staff.

What’s your acquisition process for bridges and members that go to S-BRITE?

The center is well known now, especially in our partner states. DOTs will reach out and mention they have a bridge going out of service in a year or two, ideally.

Recently, the Texas Department of Transportation said they have some components from a bridge. They sent the plans and inspection reports and asked if those would aid training and research at the center. We then review the information and let them know what component we would ideally like to save. That’s generally how the acquisition process happens right now. Any state DOT that knows of us can do that. It doesn’t have to be a partner state.

We tell them we can always say no, but once the components go in the melting pot, they’re gone. If the members are unique or have characteristics of something that would be good to share with people, give us an opportunity. Generally, we pay for shipping and put it on our truck.

Some larger bridges arrive disassembled. We have a 90-ft span through truss, both truss lines, and all the floor beams. That came in four major pieces, and our staff put them back together.

The I-35W pieces draw people’s attention. The other attention-grabbers are plate girders from the old Interstate 90 Dresbach Bridge in Minnesota with webs about 23 to 24 ft deep. Those girders are huge, and you can see them from a mile away. Those pieces are relatively short because they’re so tall, but their scale has made an impression on many visitors. They all want to stand on the flange and have their picture taken.

This article was excerpted from my interview with Rob. To hear more from him, find the March 2024 Field Notes podcast at modernsteel.com/podcasts.

Geoff Weisenberger ([weisenberger@aisc.org](mailto:weisenberger@aisc.org)) is the editor and publisher of Modern Steel Construction.
The Significance of Soft Skills

BY ERIN CONAWAY, PE

Four engineers concur that non-technical acumen was crucial in their rise to leadership positions.

ENGINEERS HAVE a wide selection of technical learning opportunities that are, of course, fundamental to the profession. Their benefit is only worth so much, though, if unaccompanied by soft skills that relate to working and interacting with other people. Soft skills are an oft-overlooked piece, but they’re just as important for a successful career in engineering.

At 2023 NASCC: The Steel Conference, a panel of engineering experts provided their perspectives on what newer engineers should know to progress successfully in their careers, with a focus on leadership and business-related skills. They also discussed what leaders should emphasize within their own companies to create future leaders.

Four prominent leaders in the structural engineering field and 2023 panel participants shared their thoughts on various industry topics, from career-path challenges to developing leadership skills.

Why did you choose structural engineering and what has been your career trajectory?

**Erleen Hatfield, PE—Hatfield Group:** I wanted to be an architect, but I found my way to structural engineering because I loved learning how things work and how buildings stand. I went to school in Nebraska and ventured to New York to work on bigger buildings.

**Stephen Lucy, PE—JQ, now IMEG:** I knew at an early age I wanted to be a civil engineer because my father and uncle were. Initially, I focused on structural and fluid dynamics because I wanted to design offshore oil platforms. Those were the largest structures being built when I was in college. The oil industry declined, and I shifted to structural consulting.

**Brian Morgen, SE, PE, PhD—Thornton Tomasetti:** Engineering careers ran in my family. My father and several uncles and aunts are in electrical, mechanical, and civil engineering. I worked in construction in high school and college and knew I wanted to design or construct structures in the community around me. The construction management program at Washington State University was in the architecture school, so I had to decide whether to attend the engineering or architecture school.

**Math was a more natural fit for me, and I chose the civil engineering program. That led to a master’s and PhD in structural engineering and my career in consulting. I spent 16 years at a world-renowned engineering firm with many influential coaches and mentors before shifting to Thornton Tomasetti in 2020 to run its Seattle office.**

**Jeanette Torrents, SE, PE—JVA:** I chose structural engineering because I liked the idea of building my community and seeing tangible results of my problem-solving. I started as a design engineer at a small-to-medium consulting firm, and 20-plus years later, I am now the director of structural engineering at the same firm.

What career path options do new engineers have today in structural engineering?

**Hatfield:** There are many options. The field is less of a ladder now and more of a lattice where someone can move up in a more flexible path, take time off, come back, and still be valued.

**Lucy:** The spectrum of options is wide. A structural engineering background is translatable to a variety of career options, including consulting, material suppliers, software development, technical sales, and construction.

**Morgen:** There is a huge need in traditional design and consulting fields. And, with technology advancing, demand is growing for computer and data scientists within structural engineering (or structural engineering folks with overlapping backgrounds in computer science).

**Torrents:** There are several. To name a few: Design, consulting, product development, and software development.

What was your greatest career path challenge?

**Hatfield:** Starting my own firm was daunting. But during my career, trying to earn the respect of others has been a constant challenge.

**Lucy:** Understanding the value of the entire team, technical and non-technical, because so much of our education was based on individual performance. My team-building skills came from extracurricular programs like Boy Scouts, not through the classroom.

**Morgen:** Developing an effective and motivating leadership style that is based on being intentional, being transparent, understanding others’ world views, and being self-aware that everything I do as a person in a position of leadership is observed and emulated.

**Torrents:** I had to overcome affinity bias and learn to articulate my goals and achievements to others.
How do you find meaning in your career?

Hatfield: Seeing a structure I designed get built is immensely gratifying. I also try to help others in their career and encourage young people to enter engineering.

Lucy: I work to make our industry the best career option and a preferred choice, as well as celebrating the wins of those around me.

Morgen: Seeing others around me grow in their professional development so they can learn to be challenged and genuinely love to come to work and be part of a collaborative process.

Torrents: I find meaning in contributing to our profession, in facilitating the success of others, and in delivering quality projects.

What skills do you consider to be the most important for a new structural engineer to acquire?

Lucy: Teamwork and communications. Understanding that you don’t know everything and asking for assistance and guidance is good. This should not be frowned upon by leadership, as none of us know everything.

Morgen: Critical thinking. Ask a lot of questions, but don’t just ask questions without thinking about the problem. Outline the problem, develop strategies to solve the problem, and then ask for advice on which direction is the best approach.

Torrents: Learning how to define the problem so you can solve the right problem. Soliciting input from all the stakeholders so that you have the perspective of the owner, user, and contractor when selecting a solution.

What soft skills, or non-technical skills, have contributed to your career?

Hatfield: Truly listening—to my managers, to clients, to peers—has been a huge help to my career.

Lucy: Listening to learn the goals of others, including both internal and external clients. Communication, both written and verbal. Business skills and recognition that we are a business first that just happens to offer engineering services.

Morgen: Being in the moment, active listening and thoughtful communication.

Torrents: Communication and learning to tailor my message and delivery to my audience. I had to learn to listen beyond the words I heard. Also, adaptability and flexibility—clearly defining my priorities so that I know when to compromise.
How did you acquire those soft skills?

**Hatfield**: I read books and articles about emotional intelligence and found mentors.

**Lucy**: I had multiple mentors within my firm and in other areas of our industry. I learned through repetition and accepting and learning from my mistakes. Valuing external consultants as buyers of expertise is why many of our firms exist.

**Morgen**: I looked at every assignment as a way to grow and learn. That happens by watching and listening to those in leadership positions. See what works and what you think doesn’t work. Then, aim to develop your own style of leadership and implement it. When mistakes happen, own them. When rewards happen, give credit to those who supported you.

**Torrents**: I did a lot of self-study and took advantage of opportunities. I pushed myself outside of my comfort zone.

What type of soft skills training should a new engineer pursue?

**Hatfield**: Negotiation skills. Everything is a negotiation.

**Lucy**: Communication. Business skills can come later after an engineering degree may not be the most productive route.

**Morgen**: Effective communication and organization.

**Torrents**: Interpersonal communication and conflict resolution.

How do soft skills help new and experienced engineers in their careers?

**Hatfield**: They’re crucial in being able to negotiate.

**Lucy**: If you work for a consulting firm, you can only consult if you can communicate. So, if you cannot convey your knowledge, it doesn’t matter how brilliant, sophisticated, or complex your answer is.

**Morgen**: In our fast-paced working environment, we are asked to do more with little. So, being organized creates efficiencies and room for professional development opportunities. Effective, clear, and concise communication is key.

**Torrents**: If you can articulate your ideas and work with others to solve problems, you will be an asset to your project team, client, and firm.

In your opinion, what makes a new engineer successful?

**Hatfield**: Asking lots of questions and understanding the point of every task assigned.

**Lucy**: Being inquisitive and striving for continuous improvement, and understanding that you only win if the team wins.

**Morgen**: Being open, inquisitive, asking questions, and a willingness to make and learn from mistakes.

**Torrents**: A combination of curiosity, learning, and a growth mindset.

How has your definition of success changed throughout your career?

**Hatfield**: Success to me is having happy clients, happy co-workers and a successful project.

**Lucy**: This is a team sport, so play accordingly. That does not mean you cannot be a individualist, but you cannot lead if you don’t consider the team.

**Morgen**: My success only comes from the success of others around me who support my efforts. When I started my career, I was focused on how I could earn more opportunities. Now, I’m focused on what I can do to find ways for others to have opportunities for professional growth.

**Torrents**: My definition of success used to be very self-focused. Over time, it shifted to focusing on the success of others. I’m successful if I’m helping others achieve their goals and realize their potential.

What advice would you give yourself if you could travel back in time?

**Hatfield**: Speak up.

**Lucy**: Understand everyone’s path will be different, and that’s OK. Set your goals and work toward them, but understand that goals and how you measure success will probably change.

**Morgen**: Outside of investment strategies in technology, I would have advised myself to talk less and listen more.

**Torrents**: Focus on your strengths, not your weaknesses. You don’t have to excel in everything to be successful. You can be yourself and find your own path.

What opportunities should an engineer seek out to progress in their career?

**Hatfield**: Identify the most successful person in your company and find a way to work with them.

**Lucy**: Mentorship—including being a mentor to others. Participation in professional organizations, including taking leadership positions. Pursue what interests you instead of what you think should interest you. Your career will span decades and should be fun and rewarding, not just work.

**Morgen**: Find an inside or outside organization that aligns with your passions and devote time and effort to it.

**Torrents**: For business and leadership skills, participate in young professionals groups, peer groups, and employee resource groups. For technical skills, become the in-house expert for a particular material, load, or software.
Erin Conaway (conaway@aisc.org) is the senior director of market development at AISC. Erleen Hatfield is the managing partner of Hatfield Group. Stephen Lucy is an executive principal at IMEG. Brian Morgen is an associate principal and the Seattle office director at Thornton Tomasetti. Jeannette Torrents is the director of structural engineering at JVA.
Fork in the Road

BY KEVIN DAMRON, PE, ADAM DeMARGEL, JOHN MICHAEL JOHNSON, AND BRAD ROBSON, PE
Environmental constraints prompted mid-project design changes to a new steel bridge in Kentucky.

THE APPALACHIAN DEVELOPMENT HIGHWAY SYSTEM (ADHS) links an entire region to major thoroughfares and guides drivers through tricky terrain.

It has 33 highway corridors that connect 13 Appalachian states with Interstate highways. Corridor Q, one of its many corridors, spans from U.S. 23 in Kentucky to Interstate 81 in Virginia. Commonly known as U.S. 460, the corridor traverses mountainous terrain in Kentucky, West Virginia, and Virginia and slices through hillsides—sometimes high above valley floors.

Corridor Q's final Kentucky link is a twin bridge crossing the Russell Fork River, CSX railroad tracks, and Kentucky Route 80. Spanning that valley meant incorporating a bridge into U.S. 460's curving path more than 220 ft above it. Steel erection is complete, and the Kentucky Transportation Cabinet (KYTC) anticipates all Corridor Q sections will open by 2025. (Progress can be monitored with the Russell Fork Bridge camera found at us460online.com).

KYTC's District 12 guided the corridor design, from initial planning studies through design and construction.

Three unique issues at the Russell Fork Bridge affected its location and layout: an active railway loading site, an abandoned mine, and a habitat for a threatened species. KYTC's decades of experience building bridges in mountainous areas and the early involvement of other design partners helped arrive at a practical design that worked around constraints.

In the early planning stages, the preferred alignment went directly over a facility that stockpiled coal and loaded it onto trains in the valley next to the Russell Fork River. KYTC and Palmer evaluated options to span over the facility with aerial easements and strategically located bridge piers that created long spans. Eventually, though, cost comparisons favored purchasing the load-out facility versus building over it. The acquisition had an unanticipated short-term benefit: owning the rail spur's bridge allowed for its fast conversion to a vehicular bridge over the Russell Fork to provide construction access.
Meanwhile, an abandoned coal mine sat more than 200 ft below the proposed roadway. Coal had been removed via the room and pillar mining method many years before, but concern about potential mine subsidence and how it could affect the twin bridges led the project team to hire a specialist to evaluate the subsidence risk and potential mitigation. In the end, the team decided to change the roadway’s alignment to avoid the area of potential subsidence.

A third unique environmental challenge arrived in 2016 when the United States Fish and Wildlife Service listed the Big Sandy Crayfish as a threatened species, and the Russell Fork was a potential habitat field. Sure enough, Big Sandy Crayfish were discovered in the river directly in the proposed bridge crossing site. Extensive consultations with wildlife and environmental organizations determined that bridge piers could be located
on the deeper side of the river but not on the shallow side where the crayfish made their habitat. The construction timeline adhered to seasonal restrictions on river work that protect the crayfish during spawning. KYTC also committed to placing a habitat structure in the river once all work is complete.

Solutions to those three challenges directly contributed to the bridge’s slight S-curve and span lengths. Once a final alignment was fixed, structural engineer Palmer Engineering advanced the design to optimize initial cost, ease of construction, and long-term maintenance. The spans needed to cross the CSX railroad tracks, the river and Kentucky Route 80 on the complex alignment. The bridge needed to be built despite limited workspace below the proposed site, on the hillsides, and across the river and railroad.

Concrete spliced I-girders and steel plate girders were evaluated. The lighter steel
girders were chosen to facilitate erection over the railroad and the river, where crane placement locations were limited. The span over the river is the longest, at 285 ft. Other spans were proportioned for efficiency (ranging from 200 ft to 265 ft), and a constant web depth of 100 in. was maintained throughout. The web depth staying under 120 in. allowed for favorable steel prices, because the major U.S. plate mills competitively roll this size plate.

Each twin bridge consists of two six-span structural units with expansion joints at the abutments and between the two units. There are four lines of plate girders in each bridge. Combined, they feature over 6,200 tons of structural steel and 188 total girder segments that, if laid out end to end, would reach over 22,700 linear ft or 4.3 miles.

KYTC knew the twin bridges (2,810 ft and 2,875 ft long, respectively) represented a sizeable investment and invited contractors to submit Alternative Technical Concepts (ATCs). ATCs were submitted, and KYTC reviewed them confidentially. Contractors could include the approved ATCs as part of their bid on the project. Palmer Engineering wanted its design to be as competitive as possible with any ATC and contacted fabricator Stupp Bridge to ensure the layout and details were efficient and economical. Stupp Bridge did an in-depth review of the preliminary design and offered several suggestions, even though it had yet to secure the fabrication bid.

Two of Stupp’s suggestions significantly altered the final design. First, hybrid girders were chosen for the bridge: AASHTO M270 Grade HPS70W weathering steel is in the high-stress regions and AASHTO M270 Grade 50W weathering steel is everywhere else. The 70 KSI steel is slightly more expensive than the 50 KSI material, so it was used only in the most logical places, which were in the top and bottom flanges over the piers and in some of the bottom flanges in the middle of the spans. That resulted in lighter field sections overall, making the bridge erection more manageable for the contractor.

Second, and more importantly, Stupp Bridge suggested that the curves were mild and said it could slash fabrication costs if the girders did not curve with the roadway alignment. After evaluation, Palmer agreed that the difference in straight segments that kink at the field splice locations could accommodate the curves without greatly complicating the design. The plate girder segments ranged in length between 100 and 140 ft and weighed 25 to 45 tons each. Using low-maintenance weathering steel also saved the cost of shop- and field-painting.

The steel design was further optimized by using rolled angle cross frames shop-welded to gusset plates, which were then bolted to connecting stiffeners in the field. There were few unique cross frame piece marks for a bridge of this size, which allowed Stupp to minimize the set-up and fabrication time of these highly repeatable intermediate cross frames. Lateral bracing was used between a single bay of girders in each bridge and only over the piers and at the abutments.
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A west-facing view of the bridge during steel erection. The valley and a river limited options for crane placement during steel erection.
KYTC received five bids for the bridge in November 2020, ranging from $65.6 million to $87.2 million. It awarded the project to the low bidder, Triton Construction. Triton selected Stupp Bridge to fabricate the girders to Palmer’s original design. Although many challenges were encountered along the way, the Russell Fork crossing is a prime example of the versatility of steel and how projects can benefit from fabricator input early in the design phase.

 Owner
 Kentucky Transportation Cabinet

 General Contractor and Erector
 Triton Construction

 Structural Engineer
 Palmer Engineering

 Steel Fabricator and Detailer
 Stupp Bridge Company

 Turning an old rail spur bridge over the Russell Fork River into a vehicular bridge allowed for easier construction access.
Kevin Damron (kdamron@palmernet.com) is a Senior Project Manager with Palmer Engineering. Adam DeMargel (apdemargel@stupp.com) is Senior Vice President of Sales for Stupp Bridge Company. John Michael Johnson (johnm.johnson@ky.gov) is the Project Manager for the U.S. 460 Project for the Kentucky Transportation Cabinet. Brad Robson (brobson@palmernet.com) is a Principal with Palmer Engineering Company.

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Banking on Steel

BY PAUL CONSTANTINI, SE, PE, GREG MARTIN, PE, AND MARY STANZIONE, PE

CITIZENS BANK PARK in Philadelphia has boasted one of Major League Baseball’s biggest and brightest video boards since it opened in 2004.

Staying on the cutting edge of in-stadium displays occasionally means upgrading them, which the park has done thrice since 2004. And each time, the Philadelphia Phillies have aimed big with their home venue’s video board.

The initial version of the board (also called PhanaVision) was primarily used for giving in-game statistics. After seven years in service, a new HD scoreboard replaced the original board during the 2010–11 offseason. That board measured 76 ft high by 97 ft wide, approximately three times the size of the previous board and, at the time, the second-largest HD screen in the National League.

The Phillies decided in the spring of 2022 that it was time, once again, to redo the video board. And again, they proposed a dramatic size increase. They engaged longtime design partner EwingCole, which designed Citizens Bank Park, to determine the maximum size video board that the existing structure could support. Before the behemoth could be built and erected at that size, though, EwingCole needed to conduct numerous engineering studies.
Installing a larger video board at Philadelphia’s Citizens Bank Park required extensive research on the existing support structure before any construction began.

To determine a maximum display board size, existing steel framing and foundations needed to be reviewed and evaluated for increased gravity loads and present-day wind loads over the increased wind area. In addition, the studies needed to include provisions for a new enlarged sign containing the Phillies name and logo above the scoreboard display.

The steel support structure is not just comprised of the video board; it's essentially a building that supports various video display modules in addition to electrical and mechanical equipment required to operate the scoreboard. One of the main left-field light towers is also interconnected with the structure.

The primary framing for the existing scoreboard and light towers consists of four structural steel laced “box columns” that are interconnected with horizontal and vertical trusses. The primary framing members in the box columns vary in size, from W14×311 sections at the base of the light towers to W14×193 at the top, all ASTM A572 Grade 50. Two box columns extend to 149 ft above the main concourse, while the other two extend higher to 200 ft to support one of the left-field LED sports lighting arrays.

The scoreboard is supported by a series of catwalks that cantilever 4 ft off the field side of the main structure. A metal panel enclosure, which is roughly 16 ft deep, exists behind the full height of the scoreboard.
and contains a series of platforms and catwalks that allow access to the scoreboard display panels and all the ancillary equipment.

The display board size increments were iterated based on preset aspect ratios for the optimal video display. Studies for the expansion began with an extensive research effort to obtain shop drawings for foundations and steel framing from the original ballpark construction. The shop drawings were compared to original construction documents to confirm as-built framing sizes and steel connection information. In addition, original structural analysis models for the existing laced box column towers created in Bentley’s STAAD structural analysis program were accessed and reused to help evaluate the original design gravity and lateral forces to accelerate 3D modeling.

Once existing foundation and member utilization ratios were determined, the video board size iterations were input into the models to determine the maximum size that the framing could safely support within its serviceability parameters. After several iterations and analyses, the team found the maximum scoreboard size with the Phillies name and logo above that the existing structure could handle: 116,300 lb and 152 ft by 86 ft.

Finding the size was only part of the project. Next, the structural team needed to create a framework to support the new display and extensions from the existing framing.

The new support skeleton required extensive vertical and horizontal expansion beyond the limits of the current display support scheme. The support for the enlarged board mandated a new space truss comprised of wide flange chords, web members, and double-angle diaphragm bracing to cantilever more than 12 ft beyond the east end of the existing box column structure for the left-field lighting tower.
In addition, the two leftmost box columns were extended vertically by 9 ft using W14×61 (ASTM A992 Grade 50) sections to accommodate the increased height of the scoreboard and the new logo. The team generated a 3D model with Bentley STAAD that included catwalks and a cantilevered space truss. Additional 2D models were generated for the two sides of the box columns perpendicular to the wind load.

The analysis models indicated that some of the existing scoreboard support catwalks needed to be reinforced to meet more stringent deflection requirements for the new display. The maximum permitted vertical deflection was L/400, or ½ in., and the maximum horizontal deflection under short-term loads was L/240. Additional catwalks were designed to support the increased width and height of the scoreboard. The catwalks are metal grating supported by horizontal trusses with W8×35 chords and W8×15 and L4×4 web members. The trusses bear on W8×31 outriggers with W×24 braces to the existing columns.

More than 400 existing bolted and welded superstructure connections needed to be evaluated to determine if the demand/capacity ratios remained within acceptable limits. The original construction steel shop drawings were studied to obtain as-built connection details. The design team determined that most original connections did not align with available scenarios within connection design software capabilities. Therefore, a combination of software analysis and hand calculations were required to determine connection capacities and limit states.
Some connections needed reinforcement for certain conditions and needed to be designed. The existing column baseplates for the laced box column towers, anchorage, pedestals, and foundations were all evaluated for the increased loads and found to be adequate.

Because of the unique geometry and connection conditions created by the expansion, most new steel connections were designed and documented on the construction documents. EwingCole engaged fabricator Berlin Steel early to provide feedback on preferred connection types, and many of the comments were incorporated prior to final construction drawing issuance with the goal of speeding up the construction process.

Construction on the modifications was slated to begin in the 2022–2023 offseason, which was shortened from six months to five when the Phillies advanced to the 2022 World Series. While Phillies fans reveled, the design team pivoted. The tight schedule required an expedited shop drawing and RFI review process. To accommodate the abbreviated construction and field erection schedule, Berlin Steel, EwingCole, and general contractor LF Driscoll developed creative design modifications that allowed for more pre-fabrication in the shop and a more modular erection process in the field.

The altered plan was especially impactful for the center field end of the scoreboard, where the new support structure cantilevers beyond the east end of the existing laced box column structure of the LED sports lighting array. EwingCole provided multiple splicing options to Berlin, allowing most of the eastern framing to be prefabricated and erected as assemblies called “cubes.”
The ten cube modules measured 12 sq. ft by 8 ft tall and are mostly comprised of W8×28 posts with W8×24 horizontal members and W8×18 diagonals. Pre-fabricating the cubes minimized the number of crane picks and enabled iron-workers to complete most of the connections in the shop or on the ground prior to erection.

During construction, 1,126 bolt holes were field drilled and 11,700 field bolts were installed. More than 10,000 in. of fillet welds, 896 in. of partial or complete penetration groove welds, and 1,460 in. of flare-bevel groove welds were also installed. The welding alone is estimated to have taken 114 worker days to complete.

Even after the World Series run slashed six weeks of a six-month construction schedule, the new 116,300-lb board was unveiled in March 2023, just in time for Opening Day. The new display, manufactured by Daktronics, can produce graphics in HD 4k quality and is 77% larger than the prior board.

The latest board measures 152 ft wide and 86 ft tall and is again one of the largest in MLB. In addition to a new video display, the size of the new Phillies logo and name above the existing scoreboard was increased and raised to the top of the new board. The existing structure gained 190 tons of structural steel to accommodate the new display.

There are zero bad seats at Citizens Bank Park, and the new PhanaVision brings the game closer to fans no matter their view.

Owner
Philadelphia Phillies

General Contractor
LF Driscoll

Architect and Structural Engineer
EwingCole

Steel Fabricator, Erector and Detailer
Berlin Steel

Paul Constantini
(pconstantini@ewingcole.com)
is a principal and the director of structural engineering.

Greg Martin (gmartin@ewingcole.com)
is a principal, and

Mary Stanzione (mstanzione@ewingcole.com)is a structural project engineer, all with EwingCole.
Passenger traffic at Denver International Airport continues to surge past its original design capacity. The airport—consisting of the Great Hall main terminal and three concourses—could accommodate up to 50 million passengers per year when it opened in 1995. In 2019, though, it welcomed 69 million passengers, with projections of reaching 100 million passengers by 2030. The increased passenger count necessitated recently completed concourse expansions and the ongoing renovations of the Great Hall main terminal, termed the “Great Hall Renovation Project.”

Phase 1 of the Great Hall Renovation Project, completed in 2021, renovated the center portion to create new check-in spaces for United Airlines and Southwest Airlines. It created a more modern check-in experience and added more capacity to the terminal, increasing operational efficiency.

Phase 2, which focuses on the northwest corner of the terminal and opens in February 2024, introduces a new security checkpoint on Level 6 that will have 60% more capacity than the existing checkpoint on Level 5. It used 260 tons of steel to expand the terminal’s capacity, and every steel component was transported to the site and erected while the airport remained operational. The key piece of the project was extending Level 6’s floor area, which required a braced frame to moment frame conversion.
A balcony extension and frame conversion were the greatest challenges in remodeling Denver International Airport’s Great Hall.

Level 6 Slab Extension

Previously, Level 6 housed ticketing counters, which were relocated to other areas in the Great Hall. The new security checkpoint requires more floor area, vertical circulation, and lateral frame modifications to accommodate passenger circulation.

Level 6’s existing floor area required an extension toward the Great Hall centerline to accommodate the new security lanes. That expansion added nine new bays of framing with more than 10,000 sq. ft of floor area by extending the existing balcony 38 ft east. Like the existing floor, the new floor framing consisted of slab-on-metal deck over composite steel framing with typical bays of wide-flange girders supporting wide-flange beams at equal spacing.

Provisions for future phases of construction were incorporated into the new framing design, including a box girder stub that will eventually support a 70-ft bridge between the east and west extensions of Level 6.

One of the biggest challenges was finding suitable locations for new hollow structural section (HSS) columns to support the new Level 6 framing. The space beneath Level 5 is occupied by the baggage handling system (BHS) and the Automated Guided Transit System (AGTS), which transports passengers to and from the concourses. Placing a column through either would not be possible without major disruptions to airport operations.
The only suitable option was to support the new HSS columns on an existing 1-ft-thick cast-in-place concrete wall that runs north-south and separates the BHS from the AGTS. The existing wall has sufficient capacity to support the new HSS column loads. It can transfer the loads to the existing drilled piers, likewise with sufficient capacity, avoiding the need for costly new foundations.

**Braced Frame to Moment Frame Conversion**

Existing braced frames behind the original ticketing counters braced the primary structure against wind, seismic, and sustained lateral demands from the membrane roof cable tensile forces.

The Great Hall’s membrane roof—reminiscent of Rocky Mountain peaks and Native American teepees—shelters passengers from Colorado’s climate. It’s a pre-stressed, tent-like structure that uses high-strength fabric supported by an intricate system of steel cables and mast columns that form the peaks in the roof system.

The cables have pre-stress forces of up to 300,000 lb and are supported vertically by the Level 7 composite steel framing in most areas and laterally by steel braced frames at Level 6 in each direction. These
frames also brace the primary structure against wind and seismic forces.

Some existing braced frame elements in the north-south direction needed to be removed and converted into more open moment frame configurations to allow for passenger circulation through the new security checkpoint. Since the membrane roof reacts against the existing Level 6 braced frames, it was imperative to match the strength of the existing system and the frame stiffness to ensure the membrane roof behaves as initially designed.

To achieve an equivalent stiffness, the moment frame beams were created by sistering wide-flange beams below existing beams, both at existing braced frame locations and at additional bays. Shims of varying thickness were welded between the bottom of the deflected existing beams and the top of the new, flat wide-flange beams. Existing steel column flexural stiffness was increased by encasing the existing W14 columns in a 30-in. by 44-in. concrete section.

Welded rebar was used to transfer the end moments into the concrete column section at the Level 7 and Level 6 beam-column connections. Access to the top flange was limited at Level 7, though. Steel “tomahawk” plates with rebar dowels were welded to the underside of the top flange of the existing beam. The unique plate shape was geometrically necessary for the top flange rebar dowels to clear the flanges of the reinforcing beam below and properly transfer forces into the column.
Construction Sequence and Erection Challenges

Construction of the lateral frame modifications was one of Phase 2’s biggest challenges. A complex construction sequence was necessary to ensure the system’s stiffness was maintained throughout construction to keep the airport operable and to provide consistent support for the permanent membrane roof cable loads. Here is the construction sequence in the north-south direction:

1. Reinforcing beams were installed at the locations uninhibited by existing braces (yellow).
2. Concrete columns were then poured below Level 6 (purple).
3. Temporary braces were installed (blue).
4. Four existing braced frames were removed (red).
5. The remaining reinforcing beams were installed (green).
6. Concrete columns were poured below Level 7 (magenta).
7. The temporary braces were removed (blue), creating the final condition.

Completing a major renovation inside an operating airport presents steel delivery and erection challenges. Structural steel pieces were delivered to the terminal via the curbside parking structure. From there, each piece was rolled into the terminal using a cart or trailer pulled by a light piece of equipment. Travel paths in some locations of the terminal were reinforced to support the point loads from equipment during this operation.

If pieces were light enough, travel through unreinforced sections of the existing slab-on-metal deck was permitted. A large spider crane with a 13,000-lb pick capacity helped erect most of the steel in Phase 2, including the slab extension. The spider crane was supported on spreader beams on the existing Level 5 precast framing. Luckily, the existing precast framing was designed for a 250 psf live load and had the capacity to resist construction loading.

Each piece of steel was evaluated for its weight and length to determine if it could be safely wheeled into position and lifted into place. Steel erector Total Welding used gantry cranes, chain hoists, and other methods in areas where the spider crane could not reach.

Martin/Martin worked closely with the general contractor, fabricator, and erector to determine splice locations for members that were either too large to transport through the terminal or too heavy to lift into place with the equipment limitations in each area.
Vertical Circulation

Moving the security checkpoint from Level 5 to Level 6 required new vertical circulation to transport passengers down to Level 4, the lowest level of the terminal and the access point for the AGTS.

A three-pack escalator that runs from the existing pedestrian connector bridge at Level 6 to Level 4 was installed through new openings cut in the existing Level 5 precast framing. Additionally, for passenger safety, the three-pack escalator was enclosed by a storefront system on each side supported by a HSS Vierendeel truss. The Vierendeel trusses live immediately outside the escalators and, along with the escalators, are supported at Levels 4, 5, and 6.

At Level 6, the existing pedestrian bridge truss framing could support the reactions from the escalators and truss enclosure and did not require strengthening. Shims leveled the escalator system on the deflected, existing truss structure.

Openings in the Level 5 precast framing were supported by a series of wide-flange beams spanning to existing precast columns. On the opening’s north side, the new wide-flange beam supporting the opening also supports the escalators. At Level 4, new escalator pit framing was installed using wide-flange beams spanning to existing pier caps, which had adequate capacity to resist the new escalator loading.

The completion of Phase 2 construction marked the halfway point in the Great Hall Renovation Project. The remaining construction phases are ongoing or in design, with completion expected in 2028. The Great Hall’s expanded capacity and improved circulation from Phase 2 will help the airport support its steadily increasing passenger volume long before the entire project is completed.

Owner
City and County of Denver

Architect
Stantec

General Contractor
Hensel Phelps

Structural Engineer
Martin/Martin, Inc. with subconsultants HCL Engineering and San Engineering

Steel Team
Fabricator
Pikes Peak Steel, LLC

Erector
Total Welding, Inc.

Detailer
Anatomic Iron Steel Detailing

Owner
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Steel Team
Fabricator
Pikes Peak Steel, LLC

Erector
Total Welding, Inc.

Detailer
Anatomic Iron Steel Detailing

Chris Adams (CAdams@martinmartin.com) is an Associate and Isabela Gonzalez (IGonzalez@martinmartin.com) is a Project Manager, both with Martin/Martin. Richard Haight (RHaight@martinmartin.com) and Thomas Lutza (TLutza@martinmartin.com) are Engineers-in-Training II with Martin/Martin.
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MANY TALL BUILDINGS utilize concrete for their primary lateral systems and structure, either because of building usage, local practices, or the benefits of adding mass to a tall structure. However, some elements of these buildings—such as spires, crowns, connecting elements between multiple towers, and cantilever features—are often best constructed with steel.

The two can coexist—usually in the form of a significant steel structure erected on the top of a tall concrete building. But that process creates many challenges with the design and erection of the steel structure and how it impacts the base structure. Often, the erection strategy will dictate the detailing of the structure and influence its design, as will dictums for erecting steel hundreds of feet above the ground. Project construction sequences and their impacts and how to engage with the concrete structure are important considerations as well.

Choosing a steel structure for certain elements goes beyond the construction benefits that steel can potentially offer. Steel often allows for an architectural expression or massing that can be difficult or impossible to accomplish using concrete. The choice to use steel for these feature elements can be as much about providing aesthetic and spatial experience as efficiency and constructability. As with all solutions, a balance between aesthetic, function, cost, and construction must be achieved, which for these feature structures, means evaluating and accommodating the impacts to the rest of the building.

That evaluation starts with understanding the loading imparted on these types of features: wind, seismic, fatigue, and building maintenance and accessibility loading. Those can be as much, if not more, of a consideration than conventional gravity loading, and all may carry different considerations than for the base building structure. Additionally, the erection procedure can also create a dominant loading situation that can frequently control some of the steel structure’s design. Creating an assumed detailed erection strategy at the early stages of the design is crucial.

Understanding the loading is only one important element to realizing these features. Another crucial one is developing the details that connect the steel element to the base building structure. Steel feature structures result in significant loading and reactions at the concrete structure—loading that cannot be accommodated by simply using conventional steel-to-concrete details such as embedded plates.

Additionally, a considerable amount of fixity and stiffness is typically required at these connections. Two frequent solutions are to embed steel shapes within the base building concrete structure or to create steel jackets for these elements. Either can have a significant impact on the design and detailing of the concrete elements, resulting in potentially thicker or larger elements or additional bracing components. And both can affect the space’s function and aesthetic.

Developing the connection details between the feature steel structure and the concrete base structure is also dependent upon the selected erection strategy. Details are often developed to facilitate the erection strategy, which can range from simply attaching individual members to the base structure to providing temporary staging areas to create or lift wholesale sections of the feature structure. An assumed erection strategy when designing elements is vital, but it’s also important to select the contractor, fabricator, and erector early in the process so all can participate in the design direction of these elements.

Three case studies that illustrate the different processes and challenges of creating these feature steel structures will be covered in a presentation at 2024 NASCC: The Steel Conference.

Steel was the preferred material for each building’s significant feature elements, even though concrete was the base building material. Adding the steel element to each required close attention to loading, detailing, and construction sequence considerations for the base building and the feature structure, especially because it is located at or near the top of a tall building.

This article is a preview of the 2024 NASCC: The Steel Conference session “Hybrid Structural Systems: The Design and Erection of Significant Steel Structures on Top of Tall Concrete Buildings.” To learn more about this session and others, and to register for the conference, visit aisc.org/nascc. The conference takes place March 20–22 in San Antonio, Texas.

James Pawlikowski (jpawlikowski@datumengineers.com) is a principal with Datum Engineers.
Through the nonconformance and corrective action process, an effective quality management system can acknowledge, address, and correct internal missteps as easily as outside ones.

**WHEN I LEARNED** I had dealer’s choice for my session topic at 2024 NASCC: The Steel Conference, I was excited at the possibility of finally breaking free from the bonds of predetermined destiny in public speaking scenarios.

I chose my topic relatively quickly, settling on nonconformances and corrective action requests (CARs). Why? Because so much of erectors’ and fabricators’ work is rigidly governed by design documents, specifications, and standards. Cataloging and resolving nonconforming work, though, is largely left to the creativity of enterprising individuals. And it’s not easy.

A well-managed company knows it always has room for improvement. Individuals operate companies, and individuals are fallible. That’s why quality management exists. Those who uphold and enforce it must know the company’s objective, how it’s supposed to be achieved, check the work, and resolving snafus before they impact anyone else. Identifying and resolving those humps is tricky too.

The nonconformance process can be daunting, no matter the company or facility size. With all the moving parts, the procedure must be solid. *Standard for Certification Programs* (AISC 207-20) is a helpful guide with requirements to satisfy, but one business’ best way of meeting them might not mesh with other companies’ objectives and processes. The right path varies from company to company. Individual business’ choices of the mechanisms that capture nonconforming work can encourage participation or pushback from involved parties.
Is the picture not quite in focus yet? Let’s examine some items from the AISC 207-20 glossary:

**Corrective action**: The action or actions undertaken to identify and eliminate the root cause of a service or process nonconformance to prevent its recurrence. Corrective action is not the repair or rework of a nonconformance.

**Corrective measure**: The action taken to bring a nonconformance into conformance.

**Nonconformance**: Attributes of materials, consumables, fabricated work, manufactured components, erected members, or processes that do not meet contract, regulatory, or internally defined requirements.

I feel safe in assuming that fabricators and erectors with a record of nonconforming work are probably better at picking out others’ nonconforming work before their own. It’s far easier to pick out someone else’s faults. Fabricator examples of nonconformance are plentiful: a mill order with pieces out of tolerance or subcontracted work (such as rolling or milling) that’s not to specification. For an erector, nonconformed work could be mislocated anchor rods or incorrect bevels on fabricated members prepped for CJP welding.

Those missteps tend to stand out, and capturing them is as simple as sending a nonconformance report to the responsible party that points out the discrepancy and requests corrective measures. Remember, corrective measures are not the same as corrective action. Most contractors, especially those certified by AISC and audited by QMC, can likely show some external nonconformance records that directly impact our work.

Nobody needs binoculars to spot external flaws. A keen eye for others’ mistakes should spark introspection: When you discover something you did incorrectly that qualifies as a nonconformance, do you capture it? Are you actively looking for internal nonconformances? Do you take them as opportunities to scrutinize your procedures, processes, and training’s effectiveness in preventing them?

It’s hard to elevate external nonconformances to CAR status. That’s the responsible party’s job, and only that party can do it. But investigating and unpacking internal nonconformances and elevating them to CAR status as needed can help any company solve systemic problems while encouraging employee participation.

My session will provide more tools to smoothen the bumps and bring employees and management into a quality improvement mindset. See you there!

---

Tim Duke (tduke@weoga.com) is a quality control and safety manager at Williams Erection Company and Atlanta Steel Erectors.
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ph: 819.693.9682
www.agtrobotics.com
AGT Robotics is an automation and robotics expert specialized in the metal industry. They also manufacture the BeamMaster Weld, a robotic welding line specifically engineered to answer all the welding needs of structural steel fabricators. BeamMaster features a small footprint, complete robotic automation and integration with dedicated software. With its attractive prices, all sizes of fabrication shops can now consider solving their welding production issues with robotic welding.

AKS Cutting Systems
booth 1058
akscutting.com

Akyapak USA
booth 633
Bursa
Turkey
ph: 813.351.7100
www.akyapakusa.com
Akyapak, one of Bursa’s most established industrial enterprises, proudly exports metal bending, punching, cutting machines and welding solutions to 120 countries in six continents and delivers high quality from Turkey to the world. Akyapak, which is the source of pride of Bursa and Turkey with its technological production facilities with a total closed area of 32,000 m², continues to lead the technology all over the world with its experienced production and management staff of 370 people.
Albina Co. Inc.
**booth 1653**
Tualatin, Ore.
**ph:** 503.692.6010 | **toll free:** 866.252.4628
www.albinaco.com

Are you in need of curved metal? Albina Co., Inc. has mastered the skills of steel and metal bending, rolling, and fabrication. We bend and roll structural steel members, various sizes of round pipe and HSS material, and plate. We work with carbon, stainless, aluminum, and most exotic metals. We have serviced the steel industry since 1939 and we provide quality curved metal products and services that stand out from the competition. We make the most of the latest technologies in the field and can produce virtually any metal component that needs to bend or curve, and we can produce difficult and unusual parts.

Allegheny Coatings
**booth 1665**
Ridgway, Pa.
**ph:** 814.772.3850
www.all-coat.com

Allegheny Coatings is a premier metal protection applicator, providing zinc flake, zinc platting, and related finishes. The company has locations in Pennsylvania and Indiana, stretching across the Eastern and Mid-west U.S. Allegheny Coatings uses rack spray, dip spin, and electroplating processes to apply its coatings.

Allfasteners
**booth 1659**
Medina, Ohio
**ph:** 888.859.6060
allfasteners.com

We supply quality fasteners of any type to a variety of industries. With decades of first-hand experience in the field, our knowledge provides a unique experience for our customers, every time—making us the place for all things fastening. We are not just fastener experts, though. Our steel fabrication capabilities have positioned us as a leader in the industry. Along with an extensive list of onsite, virtual and consumer based services, Allfasteners has cemented itself as a one stop shop for all industry needs. No matter the project, our goal is to find the solution to help you complete the job.

Allied Machine & Engineering
**booth 122**
Dover, Ohio
**ph:** 330.343.4282 | **toll free:** 800.321.5536
www.alliedmachine.com

Allied Machine & Engineering is a leading manufacturer of holemaking and finishing tooling systems. Allied devotes its advanced engineering and manufacturing capabilities to creating the widest selection of value-added tooling available to metal-cutting industries around the world. Our tooling solutions deliver the lowest cost-per-hole in a wide range of drilling, reaming, threading, boring and burnishing applications. Precision engineering and expert application support make Allied the first and best choice for solving complex metal-cutting challenges.

All-Pro Fasteners, Inc.
**booth 1525**
Arlington, Texas
**toll free:** 800.361.6627
www.apf.com

Precision fasteners engineered for structural steel construction. All-Pro Fasteners leads the industry in producing and supplying fasteners and associated products meticulously crafted to meet stringent ASTM standards. As a premier manufacturer and distributor, we specialize in construction bolts tailored for the structural steel sector. Our dedicated team of industry experts comprehends the specific demands of structural steel applications, overseeing every stage from production to quality testing and timely distribution. Count on us to deliver the exact products you require, precisely when and where you need them.

Altair
**booth 1744**
Troy, Mich.
**ph:** 248.614.2400
altair.com/architecture-engineering-construction

Altair is a global leader in computational science and artificial intelligence (AI) that provides software and cloud solutions in simulation, high-performance computing (HPC), data analytics, and AI. Altair enables organizations in the AEC industry to compete more effectively and drive smarter decisions in an increasingly connected world—all while creating a greener, more sustainable future.

American Galvanizers Association
**booth 2043**
Centennial, Colo.
**ph:** 720.554.0900
galvanizeit.org
The American Galvanizers Association (AGA), headquartered in Centennial, Colo., is a not-for-profit trade association dedicated to serving the needs of specifiers, architects, engineers, contractors, fabricators, and after-fabrication hot-dip galvanizers throughout North America. Since 1933, the AGA has provided information on the most innovative applications and state-of-the-art technological developments in hot-dip galvanizing for corrosion protection.

American Institute of Steel Construction (AISC)
**booth 1863**
Chicago
**ph:** 312.670.2400
www.aisc.org
The American Institute of Steel Construction (AISC) is a non-partisan, not-for-profit technical institute and trade association whose mission is to make structural steel the material of choice by being the leader in structural-steel-related technical and market-building activities, including specification and code development, research, education, technical assistance, quality certification, standardization, market development, and advocacy. AISC represents the total experience, judgment, and strength of the entire domestic industry of steel fabricators, distributors, and producers.

American Punch Company
**booth 811**
Euclid, Ohio
**ph:** 216.731.4501 | **toll free:** 800.243.1492
americanpunchco.com
The American Punch Company is the leading manufacturer of high-quality punches, dies, and shear blades for metalworking and structural steel fabrication. In addition, the company supplies precision tooling and custom die components to the stamping, roll forming and metal-forming industries. American Punch is proud to be ISO-certified, demonstrating a high level of commitment to quality in manufacturing and customer service. Quality tooling combined with superior customer service make American Punch the right choice for your tooling needs.

American Steel Detailing, LLC
**booth 1937**
Medina, Ohio
**ph:** 330.241.4130
www.americansteeledetailing.com

American Steel Detailing is an all U.S. structural and misc. steel detailing firm. ASD does projects all over the U.S. With a team of 15+ detailers, checkers and project managers, they are capable of completing projects large and small.

American Welding Society
**booth 2114**
Miami
**ph:** 305.443.9353 | **toll free:** 800.443.9353
www.aws.org

Founded in 1919, the American Welding Society is a nonprofit organization with a global mission: to advance the science, technology, and application of welding and allied joining and cutting processes worldwide, including brazing, soldering, and thermal spraying. By fostering knowledge, embracing change, and providing real-world opportunities through scholarships, fellowships, and workforce development, AWS provides the tools to help members succeed—and to inspire future generations of welding professionals.

AMPP
**booth 2014**
Houston
**ph:** 281.228.6278
ampp.org/home

The Association for Materials Protection and Performance, AMPP is the world’s leading organization focused on the protection of assets and performance of materials. AMPP was created when NACE International and SSPC united after more than 145 combined years of corrosion control and protective coatings expertise, and service to members worldwide. AMPP is active in more than 130 countries and has more than 40,000 members.

Color Key:
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- Heavy Machinery Area
- Safety Pavilion Exhibitor
Anatomic Iron Steel Detailing

booth 1645
North Vancouver, British Columbia, Canada
ph: 604.841.0555
www.anatomicroinc.com

Anatomic Iron Steel Detailing specializes in complex structural steel detailing, design detailing, connection design, design consulting and 3D modeling. We operate both Tekla and SDS2. We also complete steel erection animations and 3D rendering. Our multidisciplinary approach with our staff and clients has resulted in an outstanding track record of completing high profile complex projects accurately and on time. With over 300 staff, we can detail over 10,000 tons of structural steel per month. Please review our website at www.anatomicroinc.com or call 510.984.4425 to discuss our project history.

Anthem Anchor Bolt and Fasteners, LLC

booth 1561
www.anthemabf.com

Applied Bolting Technology, Inc.

booth 1329
Bellows Falls, Vt.
ph: 802.460.3100
toll free: 802.460.3100
www.appliedbolting.com

We make Direct Tension Indicators, i.e., load cells, that assure compliance with bolting standards and specs. Torque, Turn of Nut, and TCs can all produce false positive tension, and regularly do: Torque scatter is ±40%, for new bolts, and worse for weathered. Relying on torque is optimistic, at best. TCs are torque bolts that are adversely affected by cold or wet weather. Turn of Nut can be defeated by misrepresenting turn angle, regardless of turn applied. DTIs read load. If a bolt is tight, a DTI will show it, independent of weather, torque, angle, tool, or skill.

ArcelorMittal International

booth 1134
Chicago
ph: 312.899.3051
www.arcelormittal.com

ArcelorMittal is the leading supplier of quality steel products in all major steel markets, including construction. Signature products, like our HISTAR® (ASTM A913) steel, have been integral to numerous iconic structures, including One World Trade Center, 150 North Riverside, Mercedes-Benz Stadium, and SoFi Stadium. Through our world-class R&D team and outstanding distribution network, we offer innovative, competitive, and sustainable solutions that have led to several industry firsts, such as the 80ksi rolled-steel shapes supplied in Chicago’s Union Station Tower.

Armatherm Thermal Bridging Solutions

booth 1631
www.armatherm.com

Armatherm Thermal Bridging

booth 2045
Kamloops, British Columbia, Canada
ph: 250.374.3831
arrow.ca/reload

Providing a superior gateway to your markets across North America, Arrow Reload Systems Inc. has offered best in class transportation and logistics services for over 100 years. Handling a broad range of products, we provide trucking, materials handling, freight management and consulting as well as technology solutions. Arrow Reload currently has 30 locations across North America with eight new locations added in the last few months alone. The Arrow Group of Companies are leaders in bulk commodity hauling, reload operations, freight management, logistics, consulting, and technology.

Arteras Inc.

booth 1830
Duluth, Ga.
ph: 214.666.5167 ×101
arteras-inc.com

Arteras Inc. is a comprehensive structural steel detailing and engineering services company established by steel detailing professionals with more than 18 years of experience. Our business model focuses on developing your structure with precision and quickness using intelligent resources such as Tekla Structures, AutoCAD, and SDS2. Arteras provides connection design services for all types of structural steel and miscellaneous steel.

ASC Steel Deck

booth 2061
West Sacramento, Calif.
ph: 916.202.4391
ascsd.com

ASC Steel Deck is a leading structural steel roof and floor deck manufacturer servicing the Western United States. As the only manufacturer on the West Coast to offer a full line of light-gauge structural products, ASC Steel Deck’s extensive product offer meets the needs of the most complex conditions and demands for structural performance and design. The past two years, ASC Steel Deck has been focused on developing resources for engineers and architects. We have more resources and products to offer than ever before. Stop by and learn more.

Association of Women in the Metal Industries

booth 2006
Mt. Royal, N.J.
ph: 856.423.3201
www.awmi.org

AWMI is an organization of professionals, founded in California in 1981, to promote and develop the growth of women in the metal industries. With 19 chapters in the U.S. and Canada, there is an event near you! The programs and activities of AWMI are intended to enhance members’ skills and experience, address challenges confronting the industry, and promote members’ career growth with the ultimate goal of increasing the number of women employed in the metal industries. Membership is open to both women and men. To learn more about AWMI and its four cornerstones (Network, Grow, Educate, and Mentor), visit awmi.org.

Atema Inc.

booth 1728
Chicago
ph: 312.861.3000
www.atema.com

Atema specializes in building tailored AISC-compliant quality management systems for fabricators and erectors, while also offering quality assurance oversight on large bridge fabrication projects. We deliver specialized training and management assistance, guiding companies toward meeting the certification requirements of various infrastructure industry sector programs.

ATF WORLD Inc.

booth 1153
www.atfworld.com

Atlas Tube, A Zekelman Company

booth 1309
Chicago
toll free: 800.733.5682
www.atlastube.com

Atlas Tube, a Zekelman Company, is the leading manufacturer of steel hollow structural sections (HSS) and ERW straight-seam piling with seven manufacturing locations in North America. We provide an industry-leading size range with sizes up to 22 in. square, 28 in. round, and 3×10 in. rectangle, all with wall thicknesses up to 1 in. Our engineering team provides product education, connection insights, and answers to project-specific questions. Atlas products are readily available in industry standard and custom lengths, and extra-long lengths. Count on Atlas Tube for the products, services, and support you need to make your next project a success.

Autodesk

booth 2109
San Francisco
ph: 415.507.5000
www.autodesk.com/solutions/aec/bim/structural-engineering

Autodesk is changing how the world is designed and made. Our technology spans architecture, engineering, construction, product design, manufacturing, media, and entertainment, empowering innovators everywhere to solve challenges big and small. From greener buildings to smarter products to more mesmerizing blockbusters, Autodesk software helps our customers to design and make a better world for all. For more information visit autodesk.com or follow @autodesk.

Automated Layout Technology LLC

booth 201
Hudson, N.H.
ph: 603.402.3055
www.automatedlayout.com

Automated Layout Technology is the maker of the Lightning Rail, the first automated marking machine created specifically for the layout of stairs and hand rails. The Lightning Rail works with DXF files to quickly and accurately print an entire stair stringer or rail in minutes saving hours of labor. The fully automated CNC machine takes your design and prints the entire work piece on a rigid steel frame table in any configuration including rails, pickets, hangers and more. Easily place channels on the table for the automatic layout of stair stringers.
For over 20 years, Machitech has offered fully customizable cutting systems of the highest quality. Choosing Machitech means gaining free lifetime access to our team of experts, specialized assistance, and prompt technical support. Join us at booth #232 to see our Beamcut Robotic Plasma Cutting System, an industry-leading robotic plasma cutting system that integrates advanced FANUC robotics & easy-to-use 1D simulation software with Hypertherm’s XPR300 plasma systems. We will also show our Diamond Cut 5-axis CNC Plasma Table, equipped with a Hypertherm XPR300 plasma system, and our Deburring Tumbler.

Blockpad
booth 2245
Clayton, N.C.
ph: 619.733.1392
blucruit.us

Blockpad is calculation software re-imagined for engineering. Create custom calculation documents in a word processor interface, using spreadsheet style equations displayed in math notation.

Bluebeam
booth 1023
Pasadena, Calif.
ph: 626.788.4100 | toll free: 866.496.2140
www.bluebeam.com

Trusted by over 3 million individuals in more than 165 countries, Bluebeam’s smart, intuitive solutions advance the way building professionals work, manage and collaborate on projects digitally. Precisely detail, mark up, and review steel plans with our easy-to-use tools, ensuring smooth fabrication and erection. Founded in 2002 in Pasadena, Calif., Bluebeam has offices across the globe and a deep understanding of the steel industry’s needs. Bluebeam is part of the Nemetschek Group. Download a free 30-day trial on our website and see how Bluebeam can revolutionize your projects fostering trust and efficiency across the project lifecycle.

BlueRecruit
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ph: 985.502.2957
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BlueRecruit is a direct-hire marketplace for skilled-trade workers wanting to build their careers and the companies seeking their talent. The average blue-collar job requires four times more hard skills than white-collar jobs. However, the recruiting system for each industry is virtually the same. That is why BlueRecruit removes the inefficiencies of resumes and job posts and focuses on the skills and experiences that matter. Our clients see an average decrease of 74% in their hiring costs, and three times more job seeker connections than the industry standard. 83% of customers connect with at least one qualified job seeker the day they get started.

Boss Tables
booth 751
www.bosstables.com

Bosworth Steel Erectors, LLC
booth 2052
Dallas
ph: 214.371.3700
www.bosworthsteel.com

Throughout Texas—and around the U.S.—Bosworth Steel Erectors has demonstrated our ability to deliver steel construction solutions for even the most difficult commercial construction projects. As a family-owned business, we hold to the values of treating clients with integrity and honesty. These simple tenets of good business, too often neglected within the construction business, are at the core of how we approach estimating, pre-construction planning, and building a team of professionals that can be assured when it matters most.
Brainstorm Infotech  
booth 2005  
Bangalore, Karnataka  
India  
ph: 91.99.8082.2911  
www.brainstorminfotech.co.in

Brainstorm Infotech is headquartered in Bengaluru, the start-up capital of India. It has carved a niche for itself in the field of structural steel detailing and allied services with a credit of completing over 2,500 projects so far. Their expertise lies in structural steel detailing and connection design as per AISC, CISC, IS, BS and Australian standards for commercial and industrial structures. With 2D and 3D advanced modelling software. Our dedication and commitment signify the trust and respect that we have from our clients and we continue to passionately collaborate with prestigious clients from North America and build a better future.

Brown Strauss Steel  
booth 1345  
Aurora, Colo.  
ph: 303.371.2200  
toll free: 800.274.0359  
www.brownstrauss.com

Brown Strauss is the premier structural steel service center in the U.S. We have the deepest inventory for your wide flange beam, structural tube, pipe, structural channel, structural angle and your other structural needs. Brown Strauss has over 120,000 tons of structural steel on the floor ready for next day delivery. Since our founding in 1905 we’ve grown to ten locations serving 24 states, and we’re proud to be 100% employee-owned.

Bryzos  
booth 1660  
St. Louis  
ph: 844.427.9967  
www.bryzos.com

Bryzos is the fastest growing digital marketplace in the metals industry with an extensive network of buyers and sellers. Bryzos has built the first instant pricing and procurement tool for the industry, facilitating the instant trade of carbon, stainless, and aluminum products. Aptly named the Gone In Sixty Seconds™ application, you can purchase or sell your commodity metals in sixty seconds or less using our free desktop or mobile application. This is the fastest metal trading experience ever made... and we can prove it. Don’t believe us? Download it for free and check it out at www.bryzos.com.

Bull Moose Tube Company  
booth 1547  
Chesterfield, Mo.  
ph: 636.537.2600 | toll free: 800.325.4467  
www.bullmoosetube.com

Bull Moose Tube produces Hollow Structural Sections (HSS) ranging from 1–14 in. square (and rectangular equivalents) in wall thicknesses up to 0.750 in.—creating value for a wide-range of applications. As one of North America’s largest HSS producers, we’re able to offer products that meet a variety of specifications including ASTM A500, A847, A1076, A1085, A1110, A1112 (up to 110 KSI), CSA G40 and EN 10219.

Bureau Veritas North America  
booth 1826  
www.bvna.com

CDA Deploy, Inc.  
booth 1225  
Danville, Calif.  
ph: 408.375.9200 | toll free: 855.444.9497  
www.cadeploy.com

CDA Deploy, Inc. (ISO 9001:2015) is a California corporation and member of AISC, NISD, MBMA, and ACI. We offer steel engineering, steel detailing, estimation services (structural steel/PEM/Rebar), and as-built services and HSE studies (oil and gas) to 400+ clients spread across the globe. Our team of 750+ engineers/personnel specializes in structural and miscellaneous projects across industrial, commercial, residential and other industries. We work on TEKLA, SDS2, Advance Steel, AutoCAD, RebarCAD, Revit, PDS, PDMS, and other widely used platforms. We have completed more than 3,200+ projects on time with 100% quality.

Caldim Engineering Pvt. Ltd.  
booth 1860  
Chennai, Tamilnadu  
India  
ph: 044.4786.0455 | toll free: 248.455.3855  
caldimengg.com

In the competitive landscape of steel detailing and connection design for the American steel construction industry, Caldim Engineering stands out as a beacon of excellence. With a winning combination of unrivaled expertise, cutting-edge technology, precision detailing, and client-centric principles, we continue to redefine industry standards. Choosing Caldim Engineering means choosing innovation, reliability, and a commitment to delivering exceptional results in every project we undertake. With 60 plus detailers on board using latest versions of SDS2 and Tekla, we shall be your best partner for steel detailing.

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CAMBCO—The original cambering machine since 1984! Cambro 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 feed and powered rollers also available on most models. Contact us for additional information. We are looking forward to hearing from you!

Cast Connex Corporation  
booth 1011  
Toronto, Ontario  
Canada  
ph: 416.806.3521 | toll free: 888.681.8786  
www.castconnex.com

Cast Connex® is the industry leader in the architectural and structural use of cast steel components in the design and construction of buildings and bridge structures. Our products include pre-engineered connectors that simplify the design and enhance the performance of structures. We also offer design-build services for custom cast steel nodes and components.

Canam  
booth 1323  
Milford, Mass.  
ph: 866.466.8769  
www.canam.com

With over 60 years of experience and more than 300,000 projects, Canam’s expertise is rivaled only by its ambitions. We specialize in designing and manufacturing steel joists and decks for the North American construction industry. Our distinctive BuildMaster collaborative approach is transforming building design and construction, offering up to a 20% reduction in erection time. Backed by a robust team comprising over 100 engineers and more than 650 structural steel detailers and drafters, Canam goes beyond being a mere supplier; we emerge as your ideal partner for achieving success.

Cano Steel  
booth 2129  
El Paso, Texas  
ph: 915.291.5125  
www.canosteel.com

We have the equipment and qualified personnel for the installation of sheet in roofs, walls, mezzanines, acrylics, domes, as well as all kinds of accessories with high quality, safety, and speed. #GrupoCan.

Carboline  
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ph: 314.644.1000  
www.carboline.com

Carboline manufactures high-performance coatings that extend the life of steel assets and passive fire protection materials that protect people and preserve structural integrity. Scientists in our world-class research, development, and innovation lab advance asset protection, and premier technical experts guide owners, engineers, and coating contractors to material solutions that accelerate construction schedules and deliver the best overall project value.

Cascade Nut and Bolt Company  
booth 1704  
Salem, Ore.  
ph: 503.375.6445 | toll free: 888.511.1005  
www.cascadenutandbolt.com

Cascade Nut and Bolt Company is a full line fastener distributor specializing in structural boltting and anchors to steel fabricators around the country. We stock domestic, North American, and import structural bolts. We manufacture anchor bolts in house. We job pack for field bolt orders and excel at our paper work package. We are a stocking distributor of Infasco’s INF 3013 coated bolts. We are a member of AISC.

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Milford, Mass.  
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Carboline  
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Carboline manufactures high-performance coatings that extend the life of steel assets and passive fire protection materials that protect people and preserve structural integrity. Scientists in our world-class research, development, and innovation lab advance asset protection, and premier technical experts guide owners, engineers, and coating contractors to material solutions that accelerate construction schedules and deliver the best overall project value.

Cascade Nut and Bolt Company  
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ph: 503.375.6445 | toll free: 888.511.1005  
www.cascadenutandbolt.com

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Toronto, Ontario  
Canada  
ph: 416.806.3521 | toll free: 888.681.8786  
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Cast Connex® is the industry leader in the architectural and structural use of cast steel components in the design and construction of buildings and bridge structures. Our products include pre-engineered connectors that simplify the design and enhance the performance of structures. We also offer design-build services for custom cast steel nodes and components.
bends holding minimal tolerances even for plants, 60+ rolling machines, and over 120 years of experience in bending, pipes, tubes, rail, sheet and plate. With two locations to bend and roll all steel grades, sizes and thicknesses, our expertise is dedicated to customer satisfaction.

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ph: 908.996.1333 x 1
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Cerbaco line of 500+ configurations of non-metallic weld backings permit finished-quality, full-penetration welds from one side. They’re 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 1440
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ph: 708.343.8311
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 joints and beams allows structural engineers to focus on load distribution rather than attachment apparatus or welding concerns. With up to 4,000-lb capacity per system, it is ideal for the safe and economical framing and installation of rooftop units, skylights, exhaust fans, and vents.

Chicago Metal Rolled Products
booth 1122
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ph: 773.523.5757 | toll free: 800.798.4504
www.cmrp.com
Family-run since 1908, we work with our customers to bend and roll all steel grades, sizes and shapes including angles, bars, beams, channels, pipes, tubes, rail, sheet and plate. With two plants, 60+ rolling machines, and over 120 years of experience, our highly trained workforce and state-of-the-art equipment handle the most challenging jobs quickly with precision and accuracy. We have earned the respect of over 10,000 satisfied customers delivering 99% error-free tight bends holding minimal tolerances even for shapes with very complex geometries.

Cleveland Punch & Die Co.
booth 927
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www.clevelandpunch.com
Cleveland Punch & Die Company is the world leader in manufacturing punches, dies and shear blades in the steel 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 the most experienced and friendly engineering and customer service support team in the industry. We are proud of our 144 years of quality, experience and tradition. Customer service hours: 7:00 a.m.—6:00 p.m. EDT; sales@clevelandpunch

Cleveland Steel Tool
booth 1808
Cleveland
ph: 800.446.4402
www.clevelandsteeltool.com
Cleveland Steel Tool is the world leader in the manufacturing of punches, dies, shear blades and specialty tooling. Our punches, dies, shear blades and specialty tools are supplied daily to the structural steel, railroad (track and cars), farm equipment, truck frame, shipbuilding and grader blade industries, as well as serving all manner of fabricators and ornamental iron shops. In addition to the above, we also supply annular cutters, magnetic drills, portable punching units, steel saws and steel saw blades to the metal fabrication industry.

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Columbus Safety and Supply
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ph: 800.969.5035
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COMSLAB
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Georgetown, S.C.
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 unstrained ratings of one, two, and three hours for spans of 30+ feet! It’s ideal for all elevated floor construction such as hotels, schools, office, high-rise, multi-residential, and medical buildings. COMSLAB products are in compliance for NYC high rise and LA RR approvals.

Controlled Automation, Inc.
booth 625
Bauxite, Ark.
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The Fabricators & Manufacturers Association, International® (FMA) is a professional organization with more than 2,500 individual and company members from North America and 20 other countries who work together to advance the metal processing, forming, and fabricating industry. Founded in 1970, FMA brings fabricators, metal processors, equipment manufacturers, and service providers together through professional development programs, industry-exclusive networking events, market-leading publications, meaningful volunteer opportunities, and FABTECH.

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Color Key:
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Heavy Machinery Area
Safety Pavilion Exhibitor

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Indiana Grating Pvt. Ltd.
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www.indianagroup.com
Infosight designs, manufactures, and distributes thread fasteners and forged steel parts to various industries which, among others, includes construction and infrastructure, heavy trucks and equipment, as well as automotive and agriculture. Infosight puts its 60+ years of experience and expertise to work with its customers to develop tailor-made products that improve their current fastener products. With one manufacturing facility in Chillicothe (OH), as well as seven distribution centers in U.S. and Canada, Infosight’s 400 employees can service customers anywhere around the world. Ask for our new product 1¼ F2280 (Coated A490 TC).

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Infra-Metals Co. is one of the largest structural steel service centers in the U.S. We are well-positioned to satisfy your needs in New England, Mid-Atlantic, Midwest, South, and Southwest. 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. Anyone can quote a price, Infra-Metals can quote it from stock.

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International Zinc Association

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Durham, N.C.
ph: 919.287.1877
[www.zinc.org](http://www.zinc.org)

IZA MISSION: Provide global leadership, coordination, and value on strategic issues for the zinc industry, including market development, license to operate, communications, and sustainability.

Interstate Gratings

**booth 1915**
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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.

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JPW specializes in structural and misc. steel detailing. Along with detailing, JPW provides model-based estimation, connection design, and stamping for the U.S. and Canada. We follow the triangular approach to build a sustainable and long-term partnership with the clients. This includes effective communication, quality work, and scheduled deliverables. The core strength of JPW’s success is its checking process. The two layers method has helped to achieve mostly error-free drawings. When it comes to quality, JPW appears at the top of the list.

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Kinetic manufacturers 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. One Machine—Complete Parts—Start to Finish. Kinetic offers a complete solution for the structural steel industry.

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Manufacturer of high precision plasma cutting systems for use in automated production cutting of steel, stainless steel, aluminum and other materials. Kjellberg is a leader in cut quality and cost per cutting foot.

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www.minergrating.com

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www.moldtekengineering.com

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**National Association of Women in Construction**
booth 2125
Fort Worth, Texas
ph: 817.877.5551 | toll free: 800.552.3506
www.nawic.org

The National Association of Women in Construction (NAWIC) originated as Women in Construction of Fort Worth, Texas. Sixteen women working in the construction industry founded it in 1953. Knowing that women represented only a small fraction of the construction industry, the founders organized NAWIC to create a support network for women working in a male-dominated field. Women in Construction (NAWIC) originated as Women in Construction of Fort Worth, Texas. Sixteen women working in the construction industry founded it in 1953. Knowing that women represented only a small fraction of the construction industry, the founders organized NAWIC to create a support network for women working in a male-dominated field. Women in Construction of Fort Worth was so successful that it gained its national charter in 1955 and officially became the National Association of Women in Construction. Today, NAWIC is still based in Fort Worth and has more than 115 chapters throughout the U.S.

**National Institute of Steel Detailing, Inc.**
booth 2063
Shelton, Wash.
ph: 925.294.9626
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. We are comprised of company owners and professionals in the steel industry and offer membership to steel detailing firms and associated companies and individuals. By fostering a professional approach to business and advocating improved quality through member networking, education and certification, our members are highly regarded by fabricators, architects, engineers, and contractors.

**Mold-Tek Engineering**

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- Safety Pavilion Exhibitor
National Steel Bridge Alliance
booth 1863
Chicago
ph: 312.670.2400
aisc.org/nsba
The National Steel Bridge Alliance (NSBA), a division of AISC, is a national, non-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 AASHTO, 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.

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www.vulcraft.com
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toll free: 800.286.3624
www.oceanmachinery.com
Ocean Machinery delivers versatile and affordable solutions for the small to medium fabricator. Including: Ocean Avenger and Avenger Plus—the world’s best-selling CNC beam drill lines; Ocean Clipper II—the most compact CNC angle line; Ocean Liberator—the most affordable CNC beam coping machine; Ocean Blaster—the smallest footprint shot blasting solution; and Ocean Challenger—a compact, automated welding robot. Plus, several other game changing solutions that improve the efficiency and profitability of fabricators worldwide!
Ohio Gratings, Inc.

**booth 1766**
Canton, Ohio
**ph:** 330.477.6707 | **toll free:** 800.321.9800
[www.ohiogratings.com](http://www.ohiogratings.com)

Ohio Gratings is a leading manufacturer of aluminum, carbon, and stainless steel bar grating products—all proudly made in the U.S. We deliver a blend of artistry, safety, and innovation that’s unmatched. From design and manufacturing to custom fabrication, our grating experts partner with you to find the complete solution to meet your needs. Our Traction Safety Products—ALGRIP® and OnGrip® provide increased traction on grating and metal flooring applications meeting ADA and OSHA requirements. It’s this search for the unexpected that helps us repeatedly surprise and satisfy customers, keeping them “A Step Ahead.”

OpenBrIM Platform

**booth 1912**
New York
**ph:** 212.991.8956
[openbrim.org](http://openbrim.org)

Taking complexity out of digital/brim delivery! OpenBrIM is the world’s first and only on-cloud, collaborative parametric information modeling platform that combines 3D modeling, FEA, CAD, code check, load rating, inspection, asset management, and more in your web browser. Not only do we provide high ROI on resources by automation, reusability, and interoperability, but we also provide flexibility by customized workflows and dedicated engineering support. Having industry-leading customers and the OpenBrIM community, we are the pioneers of digital transformation and innovation. Try for free in your web browser!

OTH – Remote Controlled Hooks

**booth 1828**
[othrigging.com](http://othrigging.com)

Ovation Services LLC

**booth 1253**
Copley, Ohio
**ph:** 330.730.7433
[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 U.S. The Acquisition of MMW, Inc. a detailing company with over 30 years of experience in the steel industry, gives Ovation Services a talented project management team to ensure a quality product. Strong leadership, global resources and U.S. based checking uniquely qualify Ovation to be your preferred partner.

P2 Programs

**booth 1333**
Dripping Springs, Texas
**ph:** 512.858.2007
**toll free:** 800.563.6737
[www.p2programs.com](http://www.p2programs.com)

P2 Programs means state of the art barcoding and tracking. We set the industry standard for quality barcoding and efficient tracking of structural steel from raw material receipt to erection on site. Employing P2 Programs’ web-based product—STSX—you get instant, real-time information accessible from virtually any device. Since 1986, we’ve used Auto-ID technology to improve manufacturing process tracking. With our real-time update capabilities, we offer you the technological expertise and on-the-job experience needed for an affordable and successful solution to the challenges of manufacturing operations.

Pacific Stair Corporation

**booth 1609**
Salem, Ore.
**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 more than 30 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

**booth 1305**
Thane West, Maharashtra, India
**ph:** 91.98.7022.2581
[www.pangulftech.com](http://www.pangulftech.com)

Pan Gulf Technologies is an ISO 9001:2015 certified multi-disciplinary engineering solutions company with specialization in structural and miscellaneous steel detailing, as well as connection design. As one of the top steel detailing companies globally, we use Tekla and SDS2 (350+ licenses) to produce 3D models and detailed fabrication and erection drawings for industrial, commercial, and infrastructure projects worldwide. Our strengths: 5,000+ projects delivered, size ranging from 50-50,000 tonnes, 600+ expert engineers, 20+ years of proven track record, six offices/delivery centers across the globe.

Paramount Roll and Forming, Inc.

**booth 1641**
Bellflower, Calif.
**ph:** 562.944.6151 | **toll free:** 888.400.3883
[www.paramount-roll.com](http://www.paramount-roll.com)

Celebrating 60 years of outstanding service and unparalleled capacity, Paramount Roll and Forming, Inc. specializes in the fields of aerospace, architectural, commercial, construction, entertainment, food, industrial, oil, public art, and pharmaceutical. We also specialize in curved staircases, including installation, heat induction bending, rolling for heavy plates, angles, tubes, pipes, and beams.

PDM Steel

**booth 1664**
Elk Grove, Calif.
**ph:** 916.513.4548
[www.pdmsteel.com](http://www.pdmsteel.com)

Established in 1954, and headquartered in Elk Grove, Calif., PDM Steel is a leading steel supplier with 10 service locations across the Western U.S. The company provides value-added processing services and distributes a full line of steel products across a broad range of industries.

Pioneer Machine Sales

**booth 351**
Rosenberg, Texas
**ph:** 832.509.1089
[www.pioneermachinesales.com](http://www.pioneermachinesales.com)

Pioneer Machine Sales represents the global leaders in metals fabrication and machining for manufacturing processes. We distribute machinery in Texas, Arkansas, Louisiana, and Oklahoma. With more than 20 years of experience in custom metal fabrication, our goal is to offer the newest innovations in machinery and manufacturing practices from around the world with the highest quality and lowest cost per part. We offer top-of-the-line brands from world class leaders in the industry, specializing in all types of products, from small-scale to large production manufacturing facilities.

Power of Design Group, LLC

**booth 1824**
[www.podgrp.com](http://www.podgrp.com)

PPG Protective & Marine Coatings

**booth 1534**
Pittsburgh
**toll free:** 888.9PPGPMC
[www.ppgpmc.com](http://www.ppgpmc.com)

PPG delivers protective coating solutions for a wide range of industries. Whether our customers need proven protection from corrosion, high temperatures, and fire, or want to ensure durability and aesthetic performance that will protect valuable assets, we have the advanced coating systems that can meet the specific needs of any environment.
Precision Steel Systems  
**booth S51**  
Lincoln, Neb.  
**ph:** 402.413.7747  
[www.precisionsteelsystems.com](http://www.precisionsteelsystems.com)

Precision Steel Systems would like to introduce the PLS-624, a miscellaneous metal layout table for quick and accurate layout for railings, ladders, stair stringers, and more. With its ergonomic design for workers, simple programming, and economic price point, the PLS-624 will show quick return on investment for any shop looking for alternatives to making up for the skilled labor shortage.

**Procore**  
**booth 2009**  
Carperteria, Calif.  
**ph:** 952.807.5004  
[procore.com](http://procore.com)

Procore helps firms drastically increase project efficiency and accountability by streamlining and mobilizing project communications and documentation. This real-time data and accessibility minimizes costly risks and delays—ultimately boosting profits. Using our award-winning suite of project management tools, over 2 million registered Procore users across the globe manage all types of construction projects including industrial plants, office buildings, apartment complexes, university facilities, retail centers, and more.

**Prodevco Robotic Solutions Inc.**  
**booth 832**  
Concord, Ontario Canada  
**ph:** 905.761.6155  
[www.prodevcoind.com](http://www.prodevcoind.com)

Prodevco Robotic Solutions offers advanced robotic plasma steel cutting systems. There are three models the PCR42, PCR41, and PCR 31 that will process standard structural steel profiles, and round tubes from 4 in. to 26 in., cuts cope, notches, holes and weld prep, splits beams, scribes and marks on all four faces of H-beams, channels, angles, and HSS and plates using automated robotic technology. The all-in-one system reduces fabrication time, manpower, and materials to meet everyone’s goal: lower manufacturing costs.

**Project + Quality Solutions**  
**booth 1955**  
Portland, Ore.  
**ph:** 503.550.9918  
[www.projectqualitysolutions.com](http://www.projectqualitysolutions.com)

At any stage of a project, PQS represents the project owner, contractor and fabricator to provide third party representation, interpret project specifications, deliver reasonable solutions, maintain project schedule, train and certify personnel, provide expert witness services, and maintain project schedule. For quality assurance, process planning and evaluation, quality control inspections, project management, and engineering input on industry experts from PQS. We offer scalable resources, value engineering, project management/engineering, nondestructive testing, and dispute resolution.

**Qnect LLC**  
**booth 1009**  
Hadley, Mass.  
**ph:** 413.387.4375  
[www.qnect.com](http://www.qnect.com)

Qnect partners with project teams to create early connected steel models. These early connected models contain more information than typical 3D models used for bidding. The supplemental information in an early connected model results in lower and tighter bids, helps reduce project schedules and cost overruns, and ultimately aids in expediting the process of designing, fabricating and erecting structural steel. To learn more about how structural steel project teams use Qnect, please visit: www.qnect.com/customer-success-stories.

**Qualis Solutions, LLC**  
**booth 1519**  
Highlands Ranch, Colo.  
**ph:** 303.493.5400  
[www.qualissolutions.com](http://www.qualissolutions.com)

The team at Qualis Solutions has over 30 years’ experience detailing structures throughout the U.S. using AISC standards. Over the years, we’ve created drawings for a wide range of projects including office buildings, hospitals, schools, warehouses, and airports. Qualis is best known for our focus on miscellaneous metal detailing. Our team of 18 detailers have mastered the art of stairs, railing, canopies, balconies, and many other miscellaneous designs. You’ll find us easy to work with and a reliable part of your project.

**Quality Emphasis Steel Solutions Pvt Ltd.**  
**booth 1464**  
Thane, Maharashtra India  
**ph:** 973.536.2660  
[www.qessindia.com](http://www.qessindia.com)

QESS is an innovative steel detailing company dedicated to delivering high quality steel detailing services to steel fabricators, engineers, contractors and the construction industry since 2006. Quality, accuracy, efficiency and business integrity are the fundamentals we employ to ensure each job is done right the first time. Our total experience in detailing field can be counted at 16 years. QESS has been in business for nearly 20 years.

**Quality Management Company**  
**booth 1866**  
Chicago  
[www.qmcauditing.com](http://www.qmcauditing.com)

**QuickFrames**  
**booth 1521**  
Mesa, Ariz.  
**ph:** 480.656.1575  
[www.quickframes.com](http://www.quickframes.com)

QuickFrames is a leader in engineered structural steel roof frames for commercial construction, helping to speed and simplify the installation of mechanical equipment and structural framing on new construction and tenant improvement projects since 2015. Its award-winning bolt-in frames and drop-in frames are proven to save customers time and hassle with jobsite coordination while eliminating common delays with traditional angle iron framing options. QuickFrames offers engineering, award-winning service, fast production, and delivery to the U.S. and Canada.

**R.J. Watson, Inc.**  
**booth 1731**  
Alden, N.Y.  
**ph:** 716.901.7020  
[www.rjwatson.com](http://www.rjwatson.com)

R. J. Watson, Inc. delivers a diverse and custom range of products and services to customers around the world, providing high load, multi-rotational bearings, seismic isolation devices, and expansion joint systems to the bridge, highway and heavy construction industry.

**Radley LLC**  
**booth 1105**  
[www.radley.com/steel](http://www.radley.com/steel)

**Ray Fu Enterprise Co., Ltd.**  
**booth 1953**  
Kaohsiung Taiwan R.O.C.  
**ph:** 886.7.556.0180  
[www.ray-fu.com](http://www.ray-fu.com)

Ray Fu was founded in 2000 to market steel wires and fasteners to the global market as a professional screw manufacturer and exporter. The company has facilities ranging from wire processing plants, fastener factories, heat treatment factories, and packaging warehouses. Ray Fu produces screws geared for the construction and automotive industries and wires for manufacturing fasteners. Aiming at providing superior quality, Ray Fu is ISO 9001, ISO 14001, IATF16949 and AS 9100D certified to meet customers’ demands.

**Republic Steel**  
**booth 750**  
[www.republicsteel.com](http://www.republicsteel.com)

**Qubatic**  
**booth 1866**  
Chicago  
[www.qubatic.com](http://www.qubatic.com)

Qubatic Steel Detailing LLC  
**booth 1560**  
Charleston, W.V.  
**ph:** 704.516.7074  
[www.qubatic.com](http://www.qubatic.com)

Qubatic is a progressive firm offering comprehensive steel detailing, connection design, estimation, and BIM modelling services. We recognize the importance of delivering great value and experience to our clients in every project. To meet these performance standards, we have worked hard over these 11 years to develop a technical expert team of detailers and checkers along with the cutting-edge technology required for modern-day needs with all required infrastructure in a spacious office space. Qubatic is an ISO 9001:2015 certified by TÜV and an associate member of AISC and NISD.
Rex Engineering Group
booth 1651
Naperville, Ill.
ph: 630.318.1725
www.rexeg.com

Rex Engineering Group (previously known as Rex Conz Design) is a multi-disciplinary engineering firm focused on structural, MEP, and connection and construction engineering, also providing construction services and technology solutions. Our engineers are experts with decades of experience in a wide variety of market sectors and project types across the U.S. and Canada. Our designs are efficient and economical, always focused on project budgets. We view every project as a unique solution, looking for opportunities to advance new ideas and technologies. We pride ourselves on our commitment to our clients and projects.

Risa
booth 911
Foothill Ranch, Calif.
ph: 949.951.5815 | toll free: 800.332.7472
www.risa.com

Risa has been developing leading-edge structural design and optimization software for over 30 years. Our products are used by 24 of the top 25 U.S. design firms in more than 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, RisaFoundation and RisaConnection creates a powerful, versatile, and intuitive structural design environment, ready to tackle almost any design challenge.

Scotchman Industries, Inc.
booth 126
Philip, S.D.
ph: 605.859.2542
www.scotchman.com

Scotchman Industries is the most trusted hydraulic ironworker manufacturer in the U.S. (45 to 150 tons) and also builds a complete line of circular cold saws: manual to fully automatic (45 to 150 tons) and also builds a complete line of digital measuring systems, tube and pipe notchers/grinders, and a band saw.

Scougal Rubber Corp.
booth 1751
McCarran, Nev.
ph: 775.284.8500
www.scougalrubber.com

Manufacturer of bridge bearing pads, assemblies, and complex steel bridge bearing components. AISC and NTPEP certified.

SDS2 by ALLPLAN
booth 915
Lincoln, Neb.
ph: 402.441.4000 | toll free: 800.443.0782
www.sdss2.com

SDS2 is a leading provider of steel design software. A product of ALLPLAN, we support steel projects in the BIM cycle from design to construction and empower our users to deliver at the highest levels of quality and efficiency.

Seismic Bracing Company
booth 2022
Salt Lake City
ph: 801.550.7745
www.thesbcllc.com

We are makers of Buckling Restrained Brace (BRBs), the state of the art braces for bracing buildings and other structures during earthquakes. As the name implies, BRBs do not buckle. They smash and stretch axially absorbing seismic energy. We have patented a simple, easy and repeatable methods to manufacture BRBs, which brings better value to projects. Our methods have been fully tested and exceed governing building code requirements. All our projects to date have been a great success for our clients and us.

SEU (formerly SE University) by SE Solutions
booth 2059
Holland, Mich.
ph: 616.836.1702
www.LearnWithSEU.com

SEU (formerly SE University) helps structural engineers get high quality continuing education via web seminars in a format that is economical and easy to use. Every subscription includes access to both live sessions, as well as past session recordings through the SEU Learning Portal. In addition, subscribers get access to the “EIT Ramp Up” series to help younger engineers become productive faster. Provide the benefit of ongoing education to your engineers by participating in SEU!

Seyco Joist
booth 750
Houston
ph: 346.500.3605
seycojoist.com

Structural steel fabricators (steel joist, steel deck, and structural facilities).

Shandong Hanpu Machinery Industrial Co., LTD
booth 1752
Jinan City, Shangdong
China
ph: 86.531.8353.0737
www.hanputool.com

China’s most professional Electric Torque wrenc and Shear wrench manufacturer. Accept customized production. Newly products keep on the way.

Sherwin-Williams Protective and Marine
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Cleveland
ph: 216.566.2000 | toll free: 800.524.5979
protective.sherwin.com

Sherwin-Williams Protective and Marine coatings are ideal for shop application and available through our over 4,700 distribution locations. Our Sherwin-Williams NACE and SSPC certified corrosion experts ensure that your projects use technologies that reduce the critical planned timeline and achieves its expected service life. For more information, contact us at swprotective@sherwin.com.

Shop Data Systems, Inc.
booth 1508
www.shopdata.com

Short Span Steel Bridge Alliance
booth 1762
Washington
ph: 202.452.7100
www.shortspansteelbridges.org

The Short Span Steel Bridge Alliance (SSSBA) is a group of bridge and buried soil steel 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 ft in length.

SidePlate / MiTek
booth 1423
Mission Viejo, Calif.
ph: 949.238.8900
www.mtek.com

SidePlate™ Connection Designs and engineering services are now part of the MiTek® portfolio of solutions. MiTek is a platform innovator and enabler that exists to transform the building industry with better building solutions. Our software, systems, engineered products, and automation enable our customers and partners to transform the way they design, make, and build. SidePlate Connection Designs put steel where a building needs it to reduce the overall tonnage, minimize required connections, and accelerate erection times.

SigmaNEST
booth 2108
www.siganest.com

Simpson Strong-Tie Co.
booth 1215
Pleasanton, Calif.
ph: 925.560.9000 | toll free: 800.999.5099
www.strongtie.com

Simpson Strong-Tie, one of the largest suppliers of structural building products and technology in the world, is dedicated to helping build safer and stronger structures. We offer the commercial steel industry a suite of products backed by research, development, and rigorous testing, combined with our software offerings and services.

SketchDeck.ai
booth 2140
Edmonton, Alberta
Canada
ph: 780.200.7412
www.sketchdeck.ai

SketchDeck.ai is focused on accelerating automation in the construction industry. We have developed LIFT, an automated material take-off software that is changing the way estimators work in the steel industry. It is the first solution for structural steel take-offs that uses AI and machine learning to identify beams and other structural elements automatically from 2D engineering drawings. LIFT saves estimators by automating tedious, manual, and repetitive tasks in take-offs. With LIFT, what used to take hours can now be done in a matter of minutes, reducing human error and ensuring accuracy and efficiency in the estimation process.
SprayTec offers a broad range of field and shop applied surface technology solutions including: thermal spray/metalizing, specialty coatings and linings, epoxy and plural coating systems, safety traction/anti-skid, atmospheric and chemical corrosion, abrasive blasting surface preparation, and lead and asbestos abatement. Union and open shop non-union operations through teaming efforts.

Stainless Structuralss America
booth 2013
Conroe, Texas
ph: 936.538.7600
www.stainless-structurals.com
Stainless Structuralss is a global producer and supplier of sharp cornered stainless steel and carbon steel structural shapes and special custom profiles. Our standard stainless steel sections replicate the dimensions of the A6 carbon steel platform. Through a multitude of production technologies, including laser welding and extruding, we continue to be a world leader in stainless steel structural shapes and steel profiles. Our value added services include customizations, fabrication, polishing, and more. No matter the size and scope of your project, you can provide the best steel solutions for your project's designs and demands.

Steel and Pipe Supply
booth 1530
www.SteelAndPipe.com
Steel Deck Institute
booth 2058
Florence, S.C.
ph: 412.487.3325
www.sdi.org
Founded in 1939, the Steel Deck Institute (SDI) is a trade association representing steel deck manufacturers and those manufacturing products used in conjunction with steel deck. The SDI actively publishes design manuals, develops standards for steel roof and floor deck, offers website tools, provides an industry standard EPD, offers educational opportunities, and supports research related to steel deck. Our most recent publications are the 2022 ANSI Standards. These include the new and combined ANSI/SDI SD-2022, and the renewed ANSI/SDI T-CD-2022 and ANSI/SDI QA/QC-2022.

Steel Dynamics
booth 1109
Columbia City, Ind.
ph: 260.625.8100 | toll free: 866.740.8700
lpg.steeldynamics.com
Steel Dynamics, Inc. is one of the largest domestic steel producers and metals recyclers in the U.S., based on estimated annual steelmaking and metals recycling capability, with facilities located throughout the U.S. and in Mexico. Steel Dynamics produces steel products, including hot roll, cold roll, and coated sheet steel, structural steel beams and shapes, rail, engineered special-bar-quality steel, cold finished steel, merchant bar products, specialty steel sections and steel joists and deck.

Steel Erectors Association of America
booth 1862
Winston-Salem, N.C.
ph: 336.294.8880
www.seea.net
The Steel Erectors Association of America (SEAA) is dedicated to advancing the common interests and needs of all engaged in building with steel. Objectives include the promotion of safety, education and training programs for steel erectors and trades, development and promotion of standards; and cooperation with others in activities which impact the commercial construction business. SEAA develops strategic partnerships and works closely with industry groups to provide members with industry representation steel design, engineering, fabrication, labor, safety, and training groups.

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Steel Plate

**booth 343**
Pendergrass, Ga.

**ph:** 888.894.8818

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

Steel Plate Ohio is located in Streetsboro, Ohio, right outside of Cleveland. This location offers (4) oxy-fuel machines, (1) plasma machine, and (6) overhead cranes with up to 35-ton capacity and the capability to burn plates up to 20 in. thick. Steel Plate Georgia currently offers (7) oxy-fuel machines, (1) plasma machine, (2) Quickmill Intimidators, (2) Quickmill Annihilators, (3) overhead cranes with up to 40-ton capacity, and railcar access. Our oxy-fuel machines offer table space ranging from 10 ft to 20 ft wide and up to 60 ft long, while our plasma machine offers a 24 ft by 83 ft table, making no job too big to handle!

Steel Plus Network

**booth 1705**
Irishtown, New Brunswick Canada

**ph:** 902.384.5924

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

Steel Plus Network has traditionally organized meetings for members to provide opportunities for improvement to each of their operations through educational presentations, motivational messages, and industry expert reports. These meetings also fulfill our mission to coordinate our purchasing programs and networking opportunities. The regional meetings conducted by SPN along with the annual general meeting are deemed vital to the health and welfare of SPN’s members and are considered an integral part of our operation.

Steel Projects Corp.

**booth 425**
Forrest Hill, Md.

**ph:** 334.743.11730

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

Steel Projects is a company that has been editing software solutions for steel fabricators since 1994. We offer a complete, digitalized and optimized management of steel fabricators’ shop floors, including both CNC machines and manual workstations. Our main features include: project and production management, section and plate nesting, automatic CNC programming, live production monitoring, stock and purchasing management, and traceability management. Some of them are available on a dedicated Android mobile application. Today, our ambition is to remain one of the world leaders in the field.

Steel Tek Unlimited

**booth 1346**
Eden Prairie, Minn.

**ph:** 612.258.7531

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

Steel Tek Unlimited is a leading-edge company in the steel industry that specializes in customizing CAD programs and offers steel detailing to fit your needs. We are proud to say that all our work is done in the U.S. with an experienced team of people from the bridge, industrial, and commercial industries who understand today’s construction market.

Steel Tube Institute

**booth 1616**

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

Steelmax Tools LLC

**booth 126**
Littleton, Colo.

**ph:** 303.690.9146

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

Steelmax delivers high-quality solutions to the steel fabrication industry. Equipped with a premium line of metal cutting saws, magnetic drilling machines and accessories we acquired notoriety and diligently served customers. We have expanded the product portfolio for the purpose of covering more aspects of the metal fabrication industry. Our current portfolio includes a full range of plate and pipe beveling solutions, welding automation and mechanization equipment, hydraulic punches, and lifting magnets.

Today, Steelmax is an international brand sold through industrial and welding distributors around the world.

SteelSUB, LLC

**booth 2111**

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

Steelweb Inc.

**booth 2041**
Coral Springs, Fla.

**ph:** 954.757.3520 | **toll free:** 888.965.6660

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

Steelweb Inc. is a Florida-based company with over 30 years of experience in providing top-notch steel detailing services. We specialize in 3D detailing for a wide range of industrial and commercial projects, from schools and hospitals to offices. Our team of 60 detailers excels in project management, BIM coordination, BIM collaboration, estimodeling, and design-build services. We’re experts in using Tekla and SDS2 software and seamlessly integrate with Strumis, Tekla PowerFab and AGT Robotics, as well as Autodesk ReCap and BIM360.

Structural Engineering Institute of ASCE

**booth 2035**
Reston, Va.

**ph:** 703.295.6195

[www.asce.org/SEI](http://www.asce.org/SEI)

Join more than 30,000 members of the Structural Engineering Institute of ASCE to connect, learn, advance your career, and build the future of the structural engineering profession. SEI stimulates technological advancement, improves professional practice, and drives the practical application of cutting-edge research. ASCE AMPLIFY: Expanding Knowledge Into Practice This new digital platform features interactive functionality that makes it easier for civil engineers to put ASCE standards into practice. Visit amplify.asce.org for more.

**Stratumis LLC**

**booth 1029**
Collegeville, Pa.

**ph:** 610.280.9840

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

STRUMIS LLC is the world’s leading developer of steel fabrication management software. The most comprehensive and powerful end-to-end solution available to fabricators globally, we operate in more than 50 countries. Our products, which include steel estimating, fabrication information and production management, and project collaboration tools work seamlessly with third-party software and have consistently transformed our customer’s businesses within the structural steel construction supply chain. STRUMIS connects, streamlines, and simplifies all of your steel fabrication projects and resources.

Struzon Technologies Inc.

**booth 1727**
New York

**ph:** 646.992.3826

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

Struzon, a trusted structural steel detailing/engineering service partner to the construction industry and we are an organization that wears numerous caps. From being market pioneers of structural detailing, engineering, design, and research, to do well architectural results in both residential and industrial divisions, we are enlisting our company in different arenas.
Stubbs Engineering, Inc.
booth 1562
Las Cruces, N.M.
ph: 575.993.5228
www.stubbseng.com
Stubbs Engineering, Inc. delivers cost-effective and efficient structural designs to our clients. Our primary focus is providing accurate and expedited drawings, ensuring project timelines are met. With our deep knowledge in both design and construction methods, our firm goes above and beyond traditional structural firms. Leveraging our expertise in structural design, we assist clients in resolving any construction-related issues that arise. We offer integrated construction design and shop drawing packages, providing a comprehensive and holistic approach to projects. To best serve our clientele, we are licensed in 36 states, with more to come.

Sugar Steel Corporation
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Sumter Coatings, Inc., an Ergon Company
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Sumter Coatings is a manufacturer of premium industrial and specialty coatings, with a strong emphasis on corrosion resistant primers, intermediates and topcoats for structural and miscellaneous steel. Sumter Coatings is dedicated to producing coatings that protect, beautify, renew, and extend the life of our customer’s assets while meeting or exceeding the stringent specifications required by today’s architects and engineers.

Superior Glove
booth 1855
Acton, Ontario
Canada
ph: 800.265.7617
superiorglove.com
Superior Glove is a leading innovator in the design and manufacture of safety gloves and sleeves. Their products protect workers across the globe in many major industries, including construction, oil and gas, mining, and manufacturing.

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ph: 604.599.1570 ×10
www.tdsindustrial.com
TDS—where BETTER IS OUR STANDARD. TDS has been in the steel detailing business for more than 40 years and continues to service our steel fabrication customers by providing exceptional value with certainty and confidence. Being an ISO 9001:2015 certified company, we understand the need to manage and mitigate risks associated with offshore detailing and have developed a system and procedures to have 100% control over all aspects of projects. From the smallest miscellaneous projects to the heavy industrial, we have the team to do it all.

Team Detailing Solutions LLC
booth 1952
Jackson, N.J.
ph: 913.674.4485
teamdetailing.com
Team Detailing Solutions (TDS) has specialized in structural steel detailing, connection design and estimodeling in its 18 years in business. We operate SDS2 and Tekla Structure, Autodesk, Descon, Mathcad (90+ licenses) to produce 3D models and detailed fabrication and erection drawings for industrial, commercial, and infrastructure projects in AISC/CISC standards with a team of 180+ detailers, checkers, and project managers. They are capable of completing projects small/large and complex structures. We provide connection/delegated miscellaneous design calculations with Certified American PE stamp.

Techflow Inc.
booth 1553
Duluth, Ga.
ph: 205.228.0960
www.techfloweng.com
Techflow Inc., based in Duluth Ga., with support staff located in our offices in India, offers the best in 3D steel detailing, BIM coordination, connection design, pre-detailing setup, and estimating. With project management/coordination in Duluth coupled with 400 detailers and checkers in India, we provide the best in U.S. quality and competitive pricing, using Tekla, SDS2 and BoCad. Techflow holds AISC and NISD memberships, with NISD IDC-certified detailers on staff. Techflow is a QPP-certified company as recognized by the NISD ensuring quality detailing to your standards, on time.

Tectonix Steel, Inc.
booth 1359
Orem, Utah
ph: 801.377.0315
www.tectonixsteel.com
Tectonix Steel offers more than 30 years of experience providing the highest quality steel detailing using the latest technology. We are an established detailing firm with the ability to handle virtually any size job. We specialize in structural and industrial projects ranging from 200 tons to 3,000 tons.

Terracon Consultants, Inc.
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ph: 913.599.6886 | toll free: 800.593.7777
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Singapore
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www.tfeconnection.com
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Threaded Fasteners, Inc.
booth 1749
Mobile, Ala.
toll free: 800.345.4976
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Threaded Fasteners Inc. is 100% employee owned and specializes in the manufacturing, custom packaging, and distribution of steel fasteners, including A125 structural bolts, anchor bolts, nuts, washers, and more. Our manufacturing capabilities include bent anchor bolts, j bolts, structural bolts, single and double end studs, and more in plain and galvanized. We can even provide parts that are 100% melted and manufactured in the U.S. With more than 350 dedicated employee owners, $14 million in inventory, and 16 locations from Alabama, Mississippi, Florida, Oklahoma, Tennessee, Georgia, and Texas, we can meet the global needs of our customers.

Threadline Products, Inc.
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Trilogy Machinery, Inc. is the exclusive North American distributor for Swebend bending rolls as well as the exclusive U.S. distributor for Sunrise Ironworkers including CNC models, LEMAS plate bending rolls, BSP tube punching systems, and U.S. distributor for Synergy Bending Rolls. Trilogy offers sales, service, and support for every brand it sells from its Maryland headquarters and local dealers around the country.

**Trimble**

**booth 1123**
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Tekla software solutions from Trimble power the construction industry by providing technology needed to increase performance, reduce costly errors and promote greater collaboration on projects. Users can produce high-quality 3D models and construction documentation—as well as create and manage structural analysis, design, detailing and fabrication data. Designed with a commitment to improve digital construction information workflows, Tekla software gives a true competitive edge to construction industry professionals.

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**booth 1317**
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Triple-S Steel Holdings is a family of steel service centers. You know us through our structural steel brands: Triple-S Steel Supply and Intsel Steel Distributors. Our full-line service centers keep over 200,000 tons of inventory in stock. Beams, plate, and other structural materials are our stock in trade, and the fabricator is our partner to get more steel into buildings every day. We are proud to support the AISC in its mission of promoting the use of steel! Triple-S is helping our customers by modernizing our equipment and how we process materials before it leaves our facility. Give us a call to find out more!

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www.turnasure.com

Turnasure’s ViewTite® self-indicating Direct Tension Indicator is accepted and specified as the preferred self-indicator on a growing number of major structural steel projects. Its innovative and unique design is a winner for the 2022 America Fastener Innovation Award (FIA). Inspection is quick, easy, and reliable. “Green Means Go”. ViewTite is a part of the world’s most comprehensive product line of Direct Tension Indicators. DTIs provide a cost-effective solution to tensioning high-strength bolts, studs, and anchors. All TurnSure DTIs are proudly manufactured in the U.S. to ASTM and EU Standards.

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**United Structure Detailing Inc.**

**booth 2055**
Los Angeles  
ph: 480.409.1500  
unitedstructuredetailing.com

Quality assurance : on-time delivery : effective coordination—United Structure Detailing Inc. (USD Inc.), offers steel structure and miscellaneous detailing—connection design with PE stamped (all states) services. We specialize in crafting detailed shop drawings, 3D models, BIM, erection plans, etc. USD also provides NC1, IFC, CNC, DFX, DSTV, ENC, KSS, saving you money on support, operation files. USD holds both AISC and NISD memberships. Our team of seasoned professionals (detailers, checkers, and project managers) equipped with advanced software and technologies ensures we will meet the quality and schedule.

**V&S Galvanizing**

**booth 1034**
Columbus, Ohio  
ph: 800.801.3648  
www.hotdipgalvanizing.com

V&S Galvanizing is a leader in the hot-dip galvanizing industry with eight locations on the East Coast and Midwest. Specializing in corrosion protection of steel with zinc by hot-dip galvanizing. We offer the DUROZINO system of galvanizing, packaging, tagging, and guaranteed service. We also offer our COLORZINO system (paint over galvanizing) that adds brilliant color to a base of corrosion protection. V&S offers trucking and many other value added services. V&S Galvanizing is part of Voigt & Schweitzer LLC, a holding of Hill & Smith Holdings, PLC.

**Valmont Coatings**

**booth 1708**
Omaha, Neb.  
ph: 402.359.6145  
www.valmontcoatings.com

As a full-service coatings company, Valmont Coatings provides quality surface finishes that extend the service life and improve the appearance of metal products throughout the country. In fact, Valmont Coatings is one of the largest custom galvanizers in North America. Our processes and transportation capacities are designed to efficiently handle steel products of all shapes and sizes for customers anywhere in the country.

**Vectis Automation**

**booth 242**
Loveland, Colo.  
ph: 970.852.5200  
www.vectisautomation.com

Vectis Automation designs and integrates cobot metal fabrication solutions to help structural steel fabricators boost productivity amid the skilled labor shortage. Come see our easy-to-use, affordable, and versatile Cobot Welding Tool and Cobot Plasma Cutting Tool that let you quickly start automating simple, repetitive parts—freeing up your team for more complex weldments or other value-add tasks. We look forward to meeting you and starting a conversation. We always begin by taking an in-depth look at your application(s) to make sure they are a good fit for automation.

**Vegazva Technologies**

**booth 1265**
Rolling Meadows, Ill.  
ph: 630.883.4354  
www.vegazva.com

Vegazva (ISO 9001:2015) is an IL-based engineering design and detailing company and a member of NISD and AISC. With PE stamping capabilities in all states, we provide services for estimation, main, and misc. steel, commercial and industrial projects across the country through our steel detailing division. Our plant design division caters to mineral, chemical, water and wastewater, oil and gas, petrochemical, and pharma industry. With over 250 resources, 4.5 man hours of completed detailing work, over 1,200 medium to large projects delivered successfully, Vegazva is the right detailer for you.

**VIMAR Steel**

**booth 2029**
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ph: 979.250.7159  
www.vimarsteel.com

Vimar Steel was born as the American branch of Vimar Group, from its success in steel distribution. Vimar Group has 35+ years in the market, always offering unsurpassed customer service and products of the highest quality that meet all international standards. Vimar Steel supports the U.S. market with a service center strategically located in North Houston. We can guarantee supply and total coverage throughout the U.S. Vimar Steel provides professional experience and technical knowledge to assist you throughout your project. Let our competitive prices and superior customer service support your business.
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ph: 708.885.4900
www.voortman.net
Voortman Steel Machinery is the leading global manufacturer of highly automated steel processing machinery. From compact processing lines to large, fully automated systems with everything connected. Over 50 years of experience means that Voortman can offer solutions for every type of project. Voortman is continuously developing new machinery and software solutions to meet increasing industry demands. Voortman works with you to identify the best solution, tailoring systems to ensure you can exceed your processing goals.

Voss Engineering, Inc.
booth 1517
Lincolnwood, Ill.
ph: 847.673.8900 | toll free: 800.323.3935
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: SORBTEX (preformed fabric pad/cotton duck pad/CDP), VS8 Slide Bearings (PTFE and steel plate), VTB (thermal break pad), NEOSORB [AASHTO grade neoprene (poly-chloroprene)], and FIBERLAST or VOSSCO (random oriented fiber pads).

WBF Steel Services, LLC
booth 2010
Sheridan, Wy.
ph: 248.301.0901
wbfsteel.com
WBF Steel Services LLC, with 10+ years of experience, excels in delivering top-tier steel and PEMB detailing services for diverse projects. Our dedicated team specializes in 3D detailing, offering expertise in project management, BIM coordination, estimation, connection design, and engineering services. Leveraging cutting-edge technology, we use industry-leading software like Tekla and SDS2, seamlessly integrating with platforms such as Strumis, Tekla PowerFab, and BIM360. Our commitment to precision and innovation ensures solutions that meet the highest standards in the steel detailing landscape.

Whiteboard Technologies LLC
booth 1623
Corcoran, Minn.
ph: 612.605.5833
www.whiteboardtec.com
For more than two decades, Whiteboard has perfected the delivery of professional steel detailing with an unwavering focus on quality and design-based thinking in all structural steel and PEMB projects. We invest organically in having the right people who understand steel fabrication and erection from a value perspective and deliver quality solutions to a diverse range of construction projects. Our hybrid-delivery model offers on-site and offshore to ensure that there is maximum utilization of our detailing teams round the clock. We use 3D BIM software such as SDS2 and Tekla to detail the steel projects ranging from 50–15,000 tons.

Working Athlete
booth 1842
www.workingathlete.com
Würth Construction Services
booth 1717
Birmingham, Ala.
ph: 800.336.3494
www.wurthindustry.com/construction
Würth Construction Services is your one-stop shop solution for the construction industry. We supply structural fasteners, tools, PPE and safety, sealants and chemicals, abrasives, pipe clamps and hangers, electrical products, and more.

Wuxi Zhouxiang Laser Machinery Co., Ltd
booth 2027
Wuxi, Jiangsu
China
ph: 86.510.8879.4887
www.wxzhouxiang.com
China Zhouxiang Group, established in 1991, covers an area of more than 100,000m², fixed assets CNY200 million, with more than 400 staff. Zhouxiang is a high-tech enterprise which combines science and technology, industry production and trade into one. Our products mainly include H-beam welding line, CNC cutting machine, laser cutting machine, H-beam assembly machine, H-beam welding machine, H-beam straightening machine, shot blasting machine, Box beam production line, pipe fabrication equipment, welding positioner, edge milling machine, CNC drilling machine, plate rolling machine, etc.

X SERIES USA
booth 642
www.xseriesusa.com
X-Steel Detailing
booth 1145
Elgin, Ill.
ph: 854.429.2520
www.x-steeldetailing.com
X-Steel Detailing was founded in 2019. We specialize in structural (beams, columns, braces) and miscellaneous (stairs, railings) steel structures in several different industries. We use the latest technology to improve your experience, utilizing both SDS2 AND Tekla software to provide model files, BIM coordination capabilities, and electronic files (CNC, KSS) for your shop’s needs. We focus on providing quality shop drawing packages within budget and on time. We strictly adhere to our client’s standards and the AISC Code of Standard Practice and customize services as required to ensure a smooth project.

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new products

This month’s New Products features four recently released automated fabrication machines and a new driverless sideloader.

Beamcut Systems BC25
Beamcut Systems’ new BC25 is a user-friendly, versatile, robotic 3D CNC cell and platform for cutting metal parts and profiles for virtually any structural steel shape and metal type in the industry. Using high-definition plasma technology and FANUC robotics, the BC25 is a totally automated beam cutting system providing maximum optimization of the manufacturing process, which in turn improves overall repeatability and accuracy. It eliminates bothersome layout work before cutting and time-consuming and costly grinding after profiles are cut.

Manufacturers and steel fabricators can expect exceptional aftermarket support, along with a totally automated in-feed and out-feed system on a smaller footprint. They can also expect a totally automated beam cutting solution costs up to 20% less than competitive options, providing a quicker return on investment. For more information about the BC25, visit www.beamcut.com.

Lincoln Electric Cooper Cobot Cart
Lincoln Electric has combined more than a century of welding knowledge and extensive automation experience with your real-world needs to create the Cooper Cart. It’s the affordable, game-changing solution you need to level up your welding and your business. Its features include:

- The Cooper App: Makes it simple for anyone to program and create a quality weld. On screen instructions guide users step-by-step through the process of creating welds, and no training is required.
- The Power Wave® R450 Power Source: Welds with a FANUC® CRX robot driven by a Lincoln Electric Power Wave R450 power source. The Power Wave software controls and monitors welding processes delivering the highest levels of weld quality and productivity.
- Robotic Service and Support: Lincoln Electric offers free online training, in-person training classes, the support of 275 technical sales representatives, and the expertise of 115 robot technicians.
- Safety: Cooper welding cobots are designed for safe, direct human interaction.

For more information, visit: lincolnelectric.com/en/Products/Automation.

Voortman Fabricator

The construction industry is witnessing rapidly changing market requirements, causing several increasing challenges for structural steel fabricators. The most frequently heard challenge is the pressing need to deliver projects on schedule in combination with consistently decreasing availability of skilled fitters and welders.

This is where The Voortman Fabricator comes in, a groundbreaking automatic fitting and full-welding system for structural steel.

The Fabricator is the premier welding system for structural steel. Its flexibility lets users choose on the fly between Fit and Weld or only Fit. It offers the quickest turnarounds, maximum efficiency in space utilization and choice-based flexibility. All help make Voortman’s ROI the fastest on the market.

The Fabricator can help:
- Ensure on-schedule project with reliable and flexible welding capacity.
- Access a flexible workhorse free from staffing constraints.
- Achieve consistent, high-quality welds and beat material tolerances.
- Secure the quickest return on investment in the market.

To learn more, visit www.voortman.net/en/products/machinery.
Combilift Combi-AGT

Combilift has launched its first autonomous vehicle, the four-wheel electric stand-on Combi-AGT sideloader.

Combi-AGT’s design is based on the electric manually operated Combi-GTE model which has long been a very popular choice for service centers due to its ability to work efficiently in rail guided narrow aisles. The Combi-AGT harnesses the latest smart technology to meet customer demands for driverless sideloader capability. Those demands were driven in part by the desire to eliminate the presence of personnel in aisles, consistency in handling procedures, and to maximize order fulfilment, while also having a backup manual mode in case of power outages or internet disruptions.

The machine’s laser-based sensors, fitted at various positions on the chassis, constitute an anti-collision safety system. If the machine senses an obstacle or pedestrian that has entered its path, it automatically slows down and stops in cases of emergency. It will resume driving automatically when the obstacle has cleared its safety sensor area.

Combi-AGT’s natural feature navigation system is superior to traditional methods of truck navigation based on wire guidance or artificial landmarks such as reflectors. Instead, it uses the naturally occurring features in a warehouse, such as walls, racking, and columns. Its newly developed load dimension detection system operates by performing a laser scan of the load to check that its length matches the task sent to the machine. Similarly, when unloading, it checks that the rack in front has sufficient free space to accept the load. To learn more, visit https://combilift.com/combi-agt/.

ESAB Cobot

ESAB has introduced its first cobot, or collaborative robot, for MIG and pulsed MIG welding applications on steel, stainless steel, and aluminum alloys. Unlike the complex programming pendants of other cobots, the ESAB Cobot enables operators to teach welding paths using a software app that runs on a standard smart phone or tablet (Apple iOS or Android) and a “Smart Puck” to hand-guide the torch and record its position with the push of a button.

Creating a weld sequence is as simple as creating a song playlist. The ESAB Cobot costs a fraction of a pre-engineered robot cell, does not require a programmer, and deploys in a matter of hours. It features a Universal Robots UR10e industrial robot arm. UR is the automation industry’s leading provider of cobots and has an installed base of more than 50,000 cobots. Welding components include ESAB's premiere heavy industrial welding system, the Aristo® 500ix pulse power source, the RobustFeed U82 wire feeder, an air- or water-cooled torch and accessories.

A Siegmund 32-in. by 48-in. welding table organizes components and enables the cobot to move around a shop. The entire package ships on a pallet typically within two to three weeks of ordering from a distributor. Set up takes a few hours following step-by-step instructions accessed with a QR code. If a user has the skills to set-up an industrial MIG system, they have the skills to start automated welding with the ESAB Cobot. For more information, visit www.esab.com/us/nam_en/products-solutions/.
In November 2021, Congress passed the Infrastructure Investment and Jobs Act, which is now the Bipartisan Infrastructure Law. This legislation addressed the need to upgrade infrastructure that was overdue for improvement.

The Bipartisan Infrastructure Law was intended to:
• Rebuild America’s roads, bridges and rails
• Expand access to clean drinking water
• Ensure every American has access to high-speed internet
• Advance environmental justice
• Invest in communities too often left behind.

The Short Span Steel Bridge Alliance (SSSBA) continues to identify examples of states across the U.S. taking advantage of this funding opportunity to update their aging infrastructure.

There have been many recent examples of innovative bridge construction projects across the U.S., including Barron County’s installation of Wisconsin’s first steel press-brake-formed tub girder bridge.

Elsewhere, New York State Gov. Kathy Hochul recently announced that more than 2,800 bridges were replaced or improved in 2023. These projects invested more than $2.4 billion into New York’s roads and bridges and reflect the governor’s commitment to improving New York’s infrastructure. The New York State Department of Transportation replaced or improved 2,833 bridges statewide, a nearly $1.7 billion investment.

Hochul wants to enhance safety and sustainability, reconnect communities, promote growth, and enhance resiliency against climate change.

“During this construction season, we put the pedal to the metal on our record-setting efforts to modernize New York’s transportation network and improve travel all across the state,” Hochul said. “These paving and bridge projects will provide motorists in every corner of this state with a smoother ride while also helping to ensure that our transportation network can be among the most resilient and sustainable in the nation.”

As bridge owners and designers consider the numerous infrastructure-related projects that will be funded through the Bipartisan Infrastructure Law, they should ask themselves if steel is the right material to them to specify.

Bridge officials who take a holistic approach to design that includes economy, sustainability, resiliency, and durability know that steel provides a viable solution for these projects.

Steel solutions provide:
• Cost savings that can be significant: smaller abutments, use of local crews, fast installation, lighter equipment—when added up, steel provides significant cost savings.
• A durable and nonporous material, steel provides value and a significant return on investment with bridges that last more than 100 years and have minimal maintenance requirements during their service lives.
• Steel’s high strength permits longer spans, minimizing disruption to underlying habitats. In some cases, this can eliminate the need to undertake costly environmental impact studies.
• Steel from a disassembled bridge can be used again for another project. Steel is the most recycled material on the planet and can be recycled continuously without losing its strength.
Renowned engineering professor and researcher Wallace Sanders, PhD, died January 6. He was 90.

Sanders taught in the Iowa State University Department of Civil, Construction and Environmental Engineering for 34 years until his retirement in 1998. He was a passionate advocate for engineering education, with an emphasis on steel bridge design. He had many roles during his Iowa State tenure: professor; associate professor; assistant and associate director of the Engineering Research Institute for 11 years; associate dean of the College of Engineering for three years; director of the Iowa Space Grant Consortium for four years; and interim assistant vice provost for research and graduate students.

“Professor Sanders lived a remarkable life,” said W. Samuel (Sam) Easterling, PE, PhD, Iowa State's Dean of Engineering. “He served Iowa State for nearly 40 years, contributing significantly to the Civil, Construction and Environmental Engineering department; the College of Engineering; and the university. He likewise made major contributions to our profession. We will deeply miss his positive attitude, engaging smile, and friendship.”

Sanders’ research focused on the behavior and design of highway and railway bridges; aluminum structures; and developing design specifications for structures. He served on many professional and technical committees, including several within ASCE. He was on the Engineering Journal review board, the Partners In Engineering Committee, and the AISC Fellowship Award Jury.

In 2013, Sanders earned an AISC Lifetime Achievement Award for Excellence in Engineering Education. In addition, the American Society of Civil Engineers (ASCE) awarded him its Reese Research Prize and named him a fellow.

Sanders also was on committees within ASCE, the American Society for Engineering Education, the American Welding Society, the American Railway Engineering and Maintenance of Way Association (AREMA), the European Committee for Constructional Steelworks, and the Transportation Research Board.

“Wallace was the beloved secretary of AREMA Committee 15, Steel Bridges for over two decades, said Ronnie Medlock, High Steel Structures Vice President of Technical Services. ‘He imbued the committee with camaraderie, candor, and sincerity, setting an enjoyable yet imperative vitality that helped the members drive toward the best practices in steel railroad bridge design and construction. Eschewing ties and titles, Wallace kept things salient yet simple and fun. He was so liked and respected that when he stepped down as Secretary, Committee 15 established an AREMA structural engineering scholarship in his name.

“Wallace was famous for saying, ‘If you were late to the curb for the meeting field trip, you’ll get to see the back of the bus.’ How poignant, because we members all knew who was really driving the committee bus, and if Wallace was driving, you wanted to be on it.”

Iowa State still felt Sanders’ presence and impact after his retirement. In 2006, the university opened the Wallace W. and Julia B. Sanders Structural Laboratory, which houses an 80-ft by 24-ft reaction floor equipped with 300,000-lb capacity loading points on a 3-ft grid and a 15-ton overhead crane. Sanders is survived by his daughter, Linda Sanders, and son, David (Tina) Sanders; brother John (Carole) Sanders; two grandchildren, and three great-grandchildren. He was preceded in death by his wife, Julia; his parents; and his foster brother, Stephen Nettles.
NASCC
Registration for NASCC Remains Open

NASCC: The Steel Conference is heading to San Antonio, Texas, March 20–22. There’s still time to register for the industry’s top education event, featuring more than 230 technical sessions full of must-have practical information that you can implement as soon as you get home, an exhibit hall packed with 280-plus innovations you need to know about right now, and a chance to network with thousands of the world’s best designers, fabricators, erectors, and other steel fans.

The Steel Conference is the must-attend educational event of the year and focuses on providing actionable information you can put into practice right away while earning up to 16 PDHs.

The Steel Conference also incorporates six specialty conferences: the World Steel Bridge Symposium, QualityCon, Architecture in Steel, SafetyCon, SEICon24, the SSRC Annual Stability Conference, and the NISD Conference on Steel Detailing. For more details on The Steel Conference and these specialty conferences—and to register—visit aisc.org/nascc.

FHWA
FHWA Seeks Bridge Grant Applications

The Federal Highway Administration issued a notice of funding opportunity for the competitive Bridge Investment Program established by President Biden’s Bipartisan Infrastructure Law, which includes the single largest dedicated investment in bridges since the construction of the Interstate highway system.

The notice of funding is for up to $9.6 billion in fiscal year 2023 through 2026 bridge project grants and $80 million in 2023 through 2026 bridge planning project grants. This competitive grant program comes on top of more than $27 billion in formula bridge funding the U.S. Department of Transportation announced in 2022.

“With [this] funding, communities can plan and implement bridge projects that will improve safety and mobility for people in rural regions, urban areas, and places in between,” FHWA Administrator Shailen Bhatt said in a statement. “The Bridge Investment Program has already funded nearly 40 bridge projects nationwide, and this funding will help communities continue to plan and advance important bridge projects in the years ahead.”

The Bridge Investment Program notice of funding opportunity is soliciting applications for the following categories of projects:

- Planning: grants for planning, feasibility analyses, and revenue forecasting associated with the development of a project
- Bridge Project: grants for bridge replacement, rehabilitation, preservation, and protection projects with total eligible costs of $100 million or less. Both grants will cover a maximum of 80 percent of the total eligible project costs.

The deadline for fiscal year 2023 and 2024 bridge project applications is March 19. (The deadline for 2023 and 2024 planning applications was February 19). The deadline for bridge project applications for 2025 is November 1, and the deadline for 2026 applications is November 1, 2025.

Applications for fiscal year 2024 planning grants are due October 1, and 2026 planning grant applications are due October 1, 2025.

FHWA will be providing education opportunities and plans to conduct outreach regarding the Bridge Investment Program planning and bridge project grants via webinars, with technical assistance also available to recipients who receive grants.
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ASPIRING BRIDGE DESIGNERS are gearing up for competition.

Student engineers at over 200 colleges and universities across the United States and Canada are designing, fabricating, and assembling the scale river crossings they hope will bring them victory in this year’s Student Steel Bridge Competition (SSBC), a collaboration between AISC and the American Society of Civil Engineers.

These SSBC teams will put their skills and bridges to the test at 20 regional competitions this spring, with finalists advancing to the national finals at Louisiana Tech University May 31 through June 1. Regional competitions begin March 7–9 with the Gulf Coast, hosted by the University of New Orleans. The last one is the Northeast regional, held April 19–21 at the University of New Hampshire. The University of Florida’s team won the 2023 competition, its third straight title.

For more than 35 years, aspiring engineers have applied skills learned in classes to designing a scale steel bridge—assembled in a timed environment and load-tested with 2,500 lb. The bridge must span about 20 ft, and it’s also judged on aesthetics. Many SSBC alumni have called the event the highlight of their college careers, leading to professional opportunities, lasting friendships, and an incredible sense of accomplishment. Non-students can experience the contest too.

AISC and ASCE are looking for volunteers to help the schools hosting events provide an awesome in-person experience for these students. Volunteers do not need to be bridge engineers. They’re needed for setup, event judging (preceded by training), and other crucial tasks such as helping with the registration desk and distributing lunch that make the regional competitions and finals run smoothly. Previous SSBC experience is not required. Anyone interested in helping must complete the volunteer interest form found at aisc.org/ssbcvolunteers.
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