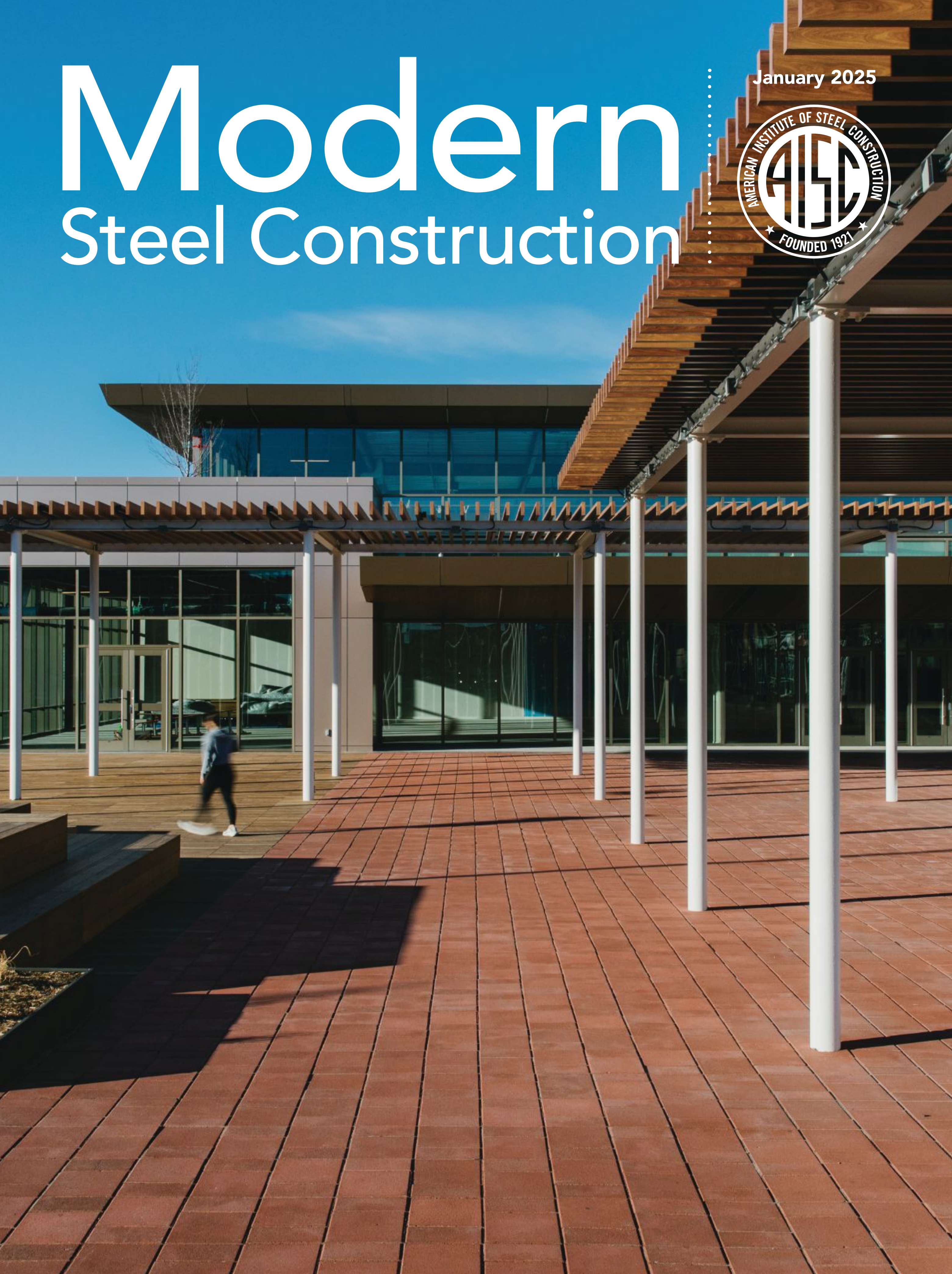
Modern Steel Construction

January 2025

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Modern Steel Construction

January 2025

in every issue

features

columns

ON THE COVER: A department store to office conversion was an ambitious steel adaptive reuse project, p. 22. (Photo: JVA)

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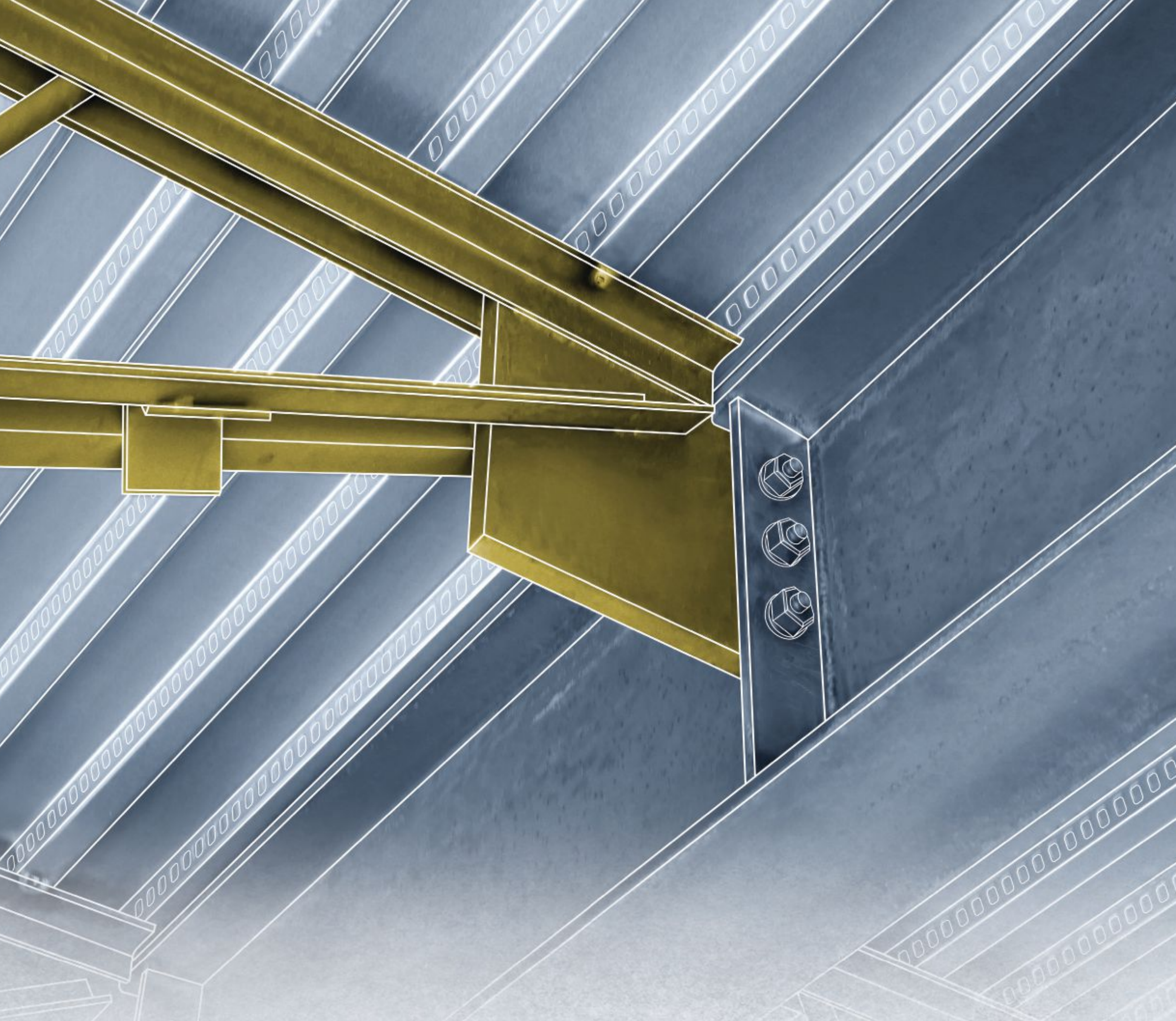

editor's note

Here we are,
a quarter of the way
through the 21st century.

It's a new year, and as we emerge from the end-of-2024 relaxation/chaos, our short-term duties either sit patiently for us on a park bench like Forrest Gump waiting for a bus or barrel towards us like a bullet train on fire.

Thankfully, we're in the business of designing and building steel structures, so we're well-acquainted with tight deadlines and demanding customers—and with how fast steel projects can come together. Speaking of which, back in 2019, AISC declared a goal of increasing the speed at which a steel building or bridge could be designed, fabricated, and erected by 50% by the end of 2025, which we dubbed our Need for Speed initiative. Of course, we're just referring to the steel framing package. If the plumbing, electrical, window, HVAC, cladding, paint, IT, drywall, concrete, and other building industries are pushing for a similar goal, more power to them!

Well, we've achieved our goal early. This wasn't due to one monumental change in the steel supply chain, but rather incremental improvements to software, machinery, and tools at every link. To be clear, this doesn't mean, all of a sudden, every steel framing project is being completed twice as quickly. But it does mean that there is a path—or rather multiple paths—for making it possible.

And we're here to tell you how. Starting with this month, the next three issues of *Modern Steel Construction* will take you a look at how to expedite steel projects from various angles. This month, we'll explore proven tactics for bringing projects together more quickly that were guided by AISC research projects, including SpeedCore, Fast-Floor, SpeedConnection and more. You can read about them on page 50.

Know where else (and when) you can learn about schedule-improving strategies? Louisville, Ky., April 2–4 at the 2025 NASCC: The Steel Conference. The annual gathering is the premier event for everyone involved in the design and construction of steel buildings and bridges and features more than 270 technical sessions (and 16 PDHs!); a giant exhibit hall showcasing more than 300 vendors promoting products and services that can help you design and build better (and faster!) with steel; and the opportunity to network with more than 6,000 colleagues, including leading designers, top fabricators, and prestigious researchers at the cutting edge of today's innovation. There are multiple sessions focusing heavily on speeding up steel projects and countless more that will highlight speed in some form or fashion.

And that reminds me: The next three issues will also contain previews of various sessions at the conference, followed by the exhibitor list in the April issue. This month's issue (on page 56) includes a look at a session on embodied carbon in steel and how determining the carbon footprint of a steel frame is more involved and intuitive than one might think.

Registration for The Steel Conference opens Wednesday, January 8 at **aisc.org/nascc**. Meanwhile, happy new year!

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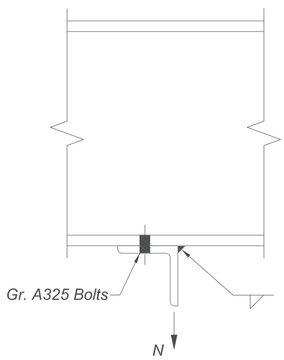
If you've ever asked yourself "Why?" about something related to structural steel design or construction, *Modern Steel*'s monthly Steel Interchange is for you! Send your questions or comments to **solutions@aisc.org**.

Load Sharing Between Bolts and Welds

Are there concerns with load sharing between bolts and welds for conditions similar to what is shown in this figure? The load shown puts the vertical leg of the angle in tension.



Yes. The AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-22, download for free at **aisc.org/specifications**) Section J1.8 addresses "Bolts in Combination with Welds." While it is permitted in some very specific cases to share load between bolts and welds, the practice is discouraged. Compatibility is likely to be a problem for bolts and welds sharing loads in tension, so it is best to assume that the weld resists the entire load.

The welds are much stiffer and stronger but less ductile when loaded transverse to their longitudinal axis. This behavior is seen in the 16th Edition AISC *Steel Construction Manual* in Figure 8-4.

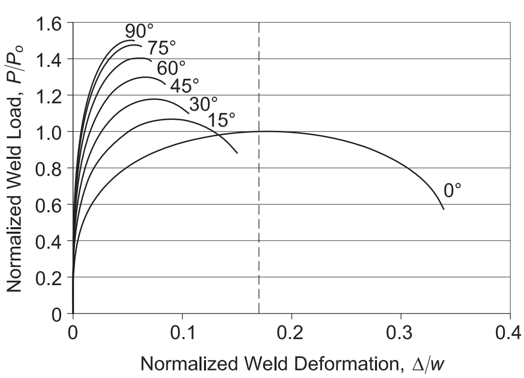


Fig. 8-4. Fillet weld strength versus deformation as a function of load angle, θ.

Additionally, for the hanger condition illustrated, the load is delivered to the weld through the vertical angle leg which is quite stiff axially. It then must run through the horizontal angle leg, which is more flexible in flexure. So again, the tendency is for all the load to be taken by the stiffer and less ductile weld.

Consideration should also be given to the single-sided fillet weld that is shown. The Commentary to the *Specification* states, "The use of single-sided fillet welds in joints subjected to rotation around the toe of the weld is discouraged." AISC Design Guide 21: *Welded Connections – A Primer for Engineers* (download for free at **aisc.org/dg**) states, "Single-sided fillet welded joints should be checked to ensure that rotation about the root of the joint cannot occur, regardless of the loading conditions. Rotation can be prevented by diaphragms or stiffeners or, in some cases, simply by the overall configuration of the member." Relying on the bolts to prevent this rotation would have to be evaluated on a case-by-case basis.

Better options for this connection exist, such as a single-plate hanger welded on both sides.

Larry Muir, PE

Sizing SCBF Braces

When selecting a brace size, should $R_y F_y$ be used in lieu of F_y when calculating the compression strength of the brace?

No. The required axial strength is determined based on an analysis as required by *Minimum Design Loads and Associated Criteria for Buildings and Other Structures* (ASCE/SEI 7-22) and using the applicable load combinations, including the seismic load effect from ASCE 7. The available strength is determined using the AISC *Specification*. The AISC 4th Edition *Seismic Design Manual* (available at **aisc.org/publications**) has an example on Special Concentrically Braced Frame (SCBF) brace design in Part 5.

R_yF_y is used to determine the expected brace strength, and the expected brace strength is used to determine the capacity-limited seismic load effect. The capacity-limited seismic load effect is used to determine the required strength of columns, beams, struts, and connections in SCBF.

Section F2.3 in the AISC *Seismic Provisions for Structural Steel Buildings* (ANSI/AISC 341-22) states, "The expected brace strength in compression is permitted to be taken as the lesser of $R_yF_yA_g$ and $(1/0.877)F_{ne}A_g$, where F_{ne} is the nominal stress calculated from *Specification* Chapter E using expected yield stress, R_yF_y, in lieu of F_y. The brace length used for the determination of F_{ne} shall not exceed the distance from brace end to brace end." This section is describing how to determine the expected brace strength, not how to design the brace.

When R_y is included in an equation, one should think of "expected strength." This is because R_y is defined as the "ratio of the expected yield stress to the specified minimum yield stress, F_y." The *Seismic Provisions* indicate when the expected strength of a member should be used.

Yasmin Chaudhry, PE

Round HSS with $D/t \geq 0.45E/F_y$

Section F8 in the 2022 AISC *Specification* states, "This section applies to round HSS having *D/t* ratios less than $0.45E/F_y$."

Is a design per Section F8 completely invalid if the *D/t* ratio exceeds this limit? If so, is there a recommended approach that could be used to address those cases?

The provisions in Section F8 are not applicable when $D/t \geq 0.45E/F_y$.

The fabrication methods for members with high *D/t* ratios can be different from the manufacturing methods in the applicable ASTM standard in *Specification* Section A2. This can cause different material and geometric imperfections compared to those that were used in the development of the equations in Section F8. Both the residual stress patterns and the initial geometric imperfections can be significantly different. The geometric imperfection tolerances for round HSS members are based on cross-sectional ovalization. However, in many cases, the geometric tolerance limits for members with high *D/t* ratios are based on local deformations.

For members with intermediate *D/t* ratios, the buckling mode is a single local buckle forming on the compression side of the member. However, for members with high *D/t* ratios, the buckling mode is characterized by several buckles instead of a single buckle. The change of buckling mode causes a higher sensitivity to geometric imperfections. This results in lower buckling strengths and reduced (often negative) post-buckling strength.

The differences in imperfections and buckling mode can significantly reduce the buckling strength. Members with high *D/t* ratios are usually classified as shell structures. Shell structures are designed using documents that consider these effects using "knock-down" factors that are dependent on the geometric tolerances and *D/t* ratio. There are several specialized standards for these structures, because the design methods are dependent on the structure type. The most comprehensive design document for general shell structures is "Buckling of Steel Shells—European Design Recommendations," published by the European Convention for Constructional Steelwork.

Bo Dowswell, PE, PhD

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This month's quiz explores one of AISC's newest publications: *Fire Protection Through Modern Building Codes*, Sixth Edition (download for free at **aisc.org/publications**). This book contains discussions and analyses of fire protection regulations in the United States and builds upon previous editions of the book published by the American Iron and Steel Institute (AISI).

1 **True or False:** In the U.S., the first official building regulations concerning fire safety appeared in the early 1900s after several U.S. cities were devastated by sweeping fires.

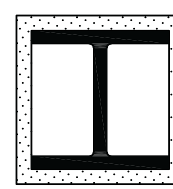
2 **True or False:** Where two or more types of construction are used in the same building, it is generally recognized that the requirements for occupancy or height and area for the least fire-resistive type of construction would apply.

3 **True or False:** A two-hour fire-resistance rating indicates that a building will last for at least two hours in the event of a fire.

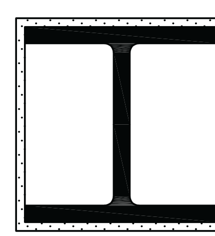
4 **Fill in the blank.** The letters "UL" in the UL Fire Resistance Directory stand for ___________.

5 Select which statement below best describes the relative fire-resistance ratings of Column A and Column B.

a. Column A has a greater fire-resistance rating than Column B.
b. Column B has a greater fire-resistance rating than Column A.
c. Column A and B have approximately the same fire-resistance rating.



Column A
W10×49
1 in. fire protection thickness



Column B
W14×233
½ in. fire protection thickness

6 **True or False:** Intumescent coatings are paint-like mixtures that serve to protect and insulate steel from heat.

7 Select the option that best completes the following statement. Above approximately ___°F, the distinct yield plateau of ASTM A36/A36M steel begins to disappear, and the stress-strain curve becomes more rounded.

a. 300 **b.** 400 **c.** 500 **d.** 600

TURN TO PAGE 12 FOR ANSWERS

steel quiz : ANSWERS

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

Answers reference *Fire Protection Through Modern Building Codes*, Sixth Edition.

1 **False.** The District Commissioners adopted the first official building regulations in 1791, limiting wood-frame structures to a height of 12 ft and not exceeding 328 ft^2.

2 **True.** Fire protection and fire safety requirements for buildings are typically codified by classifying them according to construction types, based on the materials used in structural elements and their fire resistance. There are five primary construction types and multiple subtypes in the 2021 *International Building Code*. When two or more construction types are used in the same building, it is generally recognized that the requirements for occupancy or height and area for the least fire-resistive type of construction would apply. When each building type is separated by adequate fire walls or area separation walls having appropriate fire resistance, each portion may be considered a separate building.

3 **False.** Fire-resistance rating is the time a building element, component, or assembly can confine a fire to a given area, perform a given structural function, or both, as determined by testing. The standard fire test was created to establish a method for comparing the relative performance of different construction assemblies and building components when exposed to a controlled laboratory fire. The results of tests conducted in accordance with this standard do not necessarily indicate how these assemblies will perform under actual fire conditions, which generally differ from the exposure specified in the standard. ASTM E119 is the primary procedure for determining fire-resistance ratings of building elements.

4 Underwriters Laboratories. Over the years, thousands of different construction assemblies have been tested and qualified for fire-resistance ratings. Compilations and summaries of fire-resistant assemblies are published by many organizations. The most widely used listing in the United States is the UL *Fire Resistance Directory*, published annually (Chapter 7).

5 **c.** Column A and B have approximately the same fire-resistance rating. The size of a structural steel column and the profile of fire protection materials applied to the column significantly influence fire endurance. The importance of mass is illustrated in this example, which shows two typical fire-resistant column assemblies. As shown, the W14×233 column requires approximately half the thickness of fire protection to maintain the same classification as the W10×49 column. That mass is important because of steel's thermal capacity: the more massive a section, the more total heat is required to raise its temperature. In fact, it has been demonstrated that unprotected, massive structural steel columns can develop fire endurance classifications in the range of one hour.

6 **True.** Intumescent coatings are paint-like mixtures applied to primed steel surfaces. They will expand to many times their original thickness when subjected to high heat, serving to protect and insulate the steel. They are often used for architecturally exposed structural steel.

7 **b.** 400. The distinct yield plateau of ASTM A36/A36M steel begins to disappear above approximately 400 °F, as illustrated in Figure 7-7 of the book. Figures 7-8, 7-9, and 7-10 also illustrate the effects of temperature on the modulus of elasticity and tensile and yield strengths of carbon steel meeting the requirements of ASTM A36/A36M.

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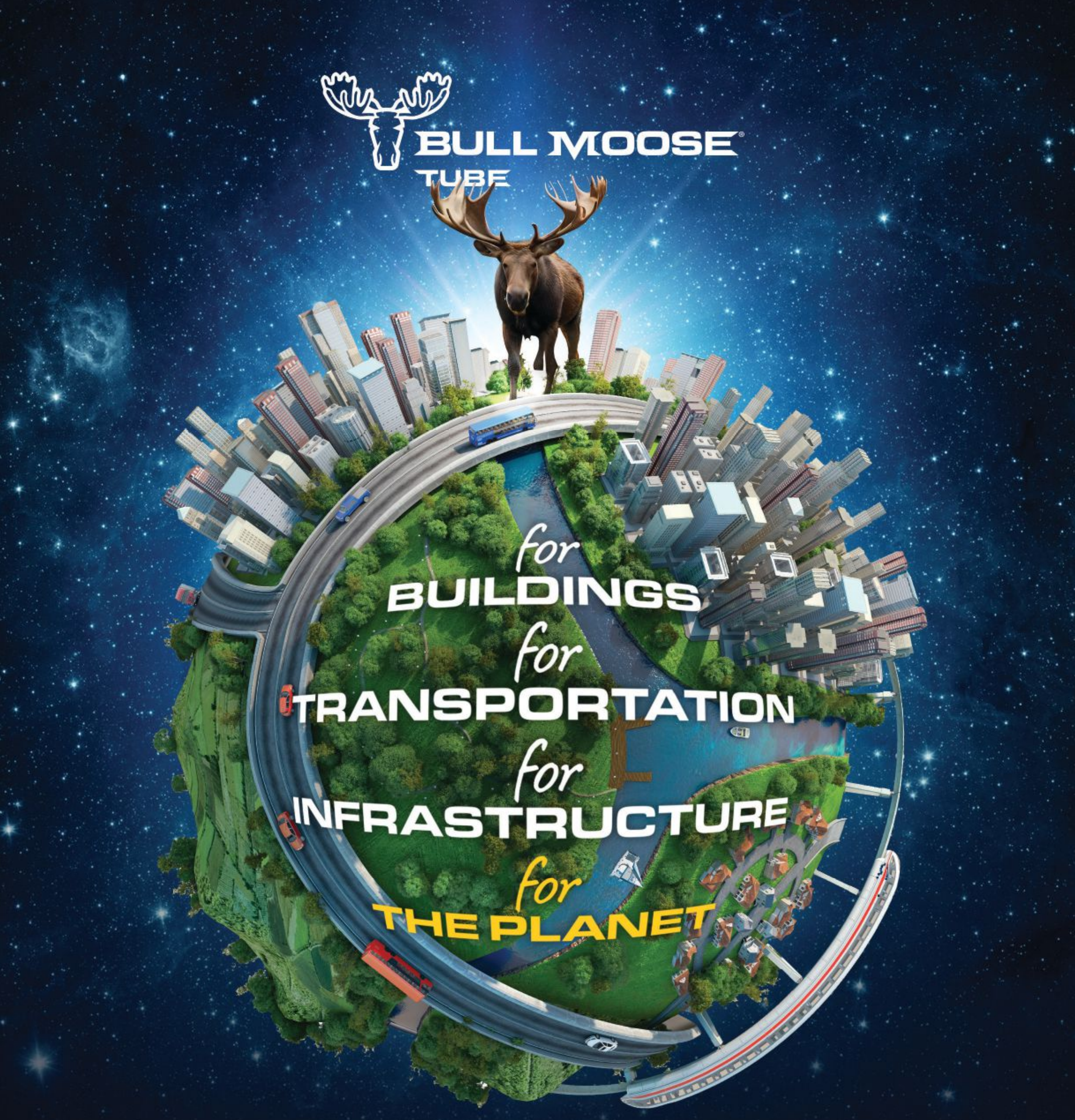
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Considerations for Cladding Connections

BY COLLEEN STUBER ZUKANOVIC, AIA AND EZRA ARIF EDWIN, SE

The exterior cladding on a steel building requires meticulous connection design to the main structure. Consider these cladding tips in the design phase.

Tori T. Chang

Fig. 1.

EXTERIOR WALL CLADDING is a versatile and functional component of modern building design, balancing performance with aesthetic appeal. In steel structures, though, it requires careful connections to the building it enhances—much like the steel frames themselves.

Connections between cladding systems and structural steel framing must be designed to provide adequate support and allow the two systems to function together. Coordination between architects, engineers, cladding specialists, and manufacturers early in the design process is vital to address specific requirements and ensure comprehensive integration of cladding with the steel structure.

The exterior cladding material enhances building aesthetics while shielding the underlying structure from environmental elements like rain, wind, and UV rays. The cavity air space behind the exterior cladding allows for drying and directs incidental water away from the building via flashings. Insulation provides thermal performance and a weather-resistive barrier (WRB) system over a sheathing substrate prevents water and air infiltration.

Cladding systems are typically connected to a secondary wall system, such as cold-formed steel backup walls, which is in turn connected to the primary structural steel frame. There are several key considerations for the cladding connection to steel-framed structures in cavity wall systems: interaction with the primary steel frame, WRB continuity, moisture management and material selection, and construction tolerances. Meticulous design, construction, and field quality control techniques are required for providing a building enclosure and primary structural frame that complement each other and perform as intended.

While an extensive range of possible exterior wall assembly design and detailing methods exist, this article focuses on the general characteristics of rainscreen veneer cavity wall systems. AISC Design Guide 22: *Façade Attachments to Steel Framed Buildings* (download for free at **aisc.org/dg**) provides additional in-depth guidance on connections between various cladding systems and structural steel buildings.

Steel Frame Interaction

Careful connection detailing between the cladding or secondary wall system and the primary steel frame is necessary to avoid imparting unintended forces, deformations, or rotations to the cladding system or structure. Designers must consider the expected performance of the cladding system, structural steel frame, and their interaction.

Collaboration between engineers, architects, and cladding manufacturers early in the design process is important to understand connection design requirements. System compatibility is primarily achieved by allowing for relative movement, and detailing should consider the vertical, in-plane lateral, and rotational deformations of the cladding and supporting structure.

Vertical movements in steel structures occur as structural members deflect under the weight of building components, occupancy, and environmental loading. Thermal and moisture exposure also cause cladding to expand and contract vertically. Connections can allow for vertical movement by using slotted holes in connecting plates or by providing gaps between the primary structure and secondary framing (Figure 1).

Relative movement in the in-plane lateral direction may be required to avoid unintentionally loading the cladding system. As applied forces follow the stiffest load path, cladding systems with a high in-plane stiffness relative to the primary lateral load resisting system can attract loads unless disconnected from the in-plane structural system by detailing that permits relative movement. The disconnecting can be achieved with horizontally slotted holes in connecting plates or low-friction bearing materials at bearing-type connections.

Fig. 2.

When the cladding system is offset horizontally from the perimeter steel frame, or connections are offset vertically from structural diaphragms, the resulting eccentric loads cause rotational or torsional deformation of steel spandrel girders. Connections made to torsionally flexible spandrel girders may require additional restraint, which can be provided through intermediate kickers (Figure 2) or roll beams to reduce rotation of the exterior cladding at floor levels. In all cases, the cladding connection layout and detailing should avoid unintentional rotational restraint of the cladding system.

WRB Continuity

The penetration of cladding anchors through the exterior sheathing material must be air- and water-tight to maintain the integrity of the WRB layer and prevent moisture-related issues. WRB products, whether sheet- or liquid-applied, have different manufacturer requirements for the treatment of penetrations and fasteners. Some membranes are required to be sealed or flashed at penetrations, while others are considered self-sealing, meaning the material can seal itself around fastener penetrations and remain weather-tight.

Fig. 3.

Fig. 4.

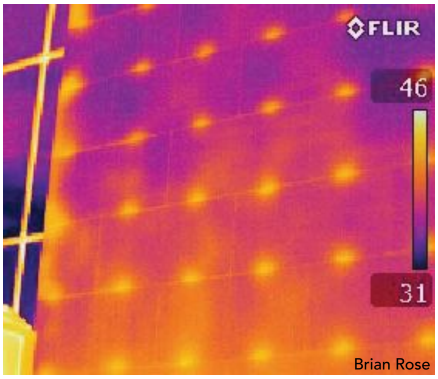

Fig. 5.

However, relying on the self-sealing ability of a membrane is not always reliable when blind fastening (Figure 3). Gasketed washers can be installed tightly between the fastener and the WRB to ensure that water, air, and moisture are unable to infiltrate into the sheathing.

WRB penetrations at cladding connections and masonry ties should be field-tested to verify the air barrier continuity. An appropriate test method, commonly known as the "bubble gun test," is in ASTM E1186 *Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Barrier Systems* (Figure 4). The test involves applying a soapy liquid to the surface of the WRB at joints and penetrations and using a handheld pressure chamber to depressurize the area within the clear plastic dome. If there is an air leak, which could also signify a potential water infiltration path, depressurization will produce a continuous stream of bubbles.

Thermal Bridging

Cladding anchor connections to the backup steel frame can create thermal bridges (Figure 5), causing heat loss or condensation. A cladding attachment strategy that allows the exterior insulation to remain continuous can be achieved with careful detailing and by using recently developed thermal break products.

At rainscreen attachment systems, subframe fasteners installed through insulation are preferable to insulation installed between continuous vertical or horizontal z-girts attached directly to the backup wall. If utilizing a z-girt or clip and rail system, an option to improve the thermal conductivity rate is to install a thermal break between the attachment system and the steel structure (Figures 6 and 7).

Thermal bridges commonly occur at relieving angles and lintel transitions in masonry veneer cavity wall systems. Relieving angles with knife plate connections to the spandrel girder or slab edge allows for insulation to be installed behind the relieving angle. Utilizing thermally broken girts, fiberglass girts systems, or discrete shims behind girts in structural sub-girt systems can lessen the possibility of a thermal bridge.

Moisture Management and Material Selection

Incidental water and condensation in the wall cavity must be properly controlled. Flashing is the single most important element in the long-term waterproofing performance of a wall assembly, but it is often an afterthought. At relieving angles, lintels, and material transitions, through-wall flashing is imperative to control water flow in the wall cavity (Figure 7).

Because of the moisture in cavity walls, the durability and compatibility of the concealed materials in the cavity must be considered. Stainless steel or aluminum cladding connection materials can prevent durability issues associated with painted or zinc-coated steel, where the protective coating (paint or zinc) breaks down over time and leaves the underlying material exposed.

However, dissimilar metals connected to carbon or galvanized steel structural systems may require electrical isolation with neoprene, mylar, nylon, PTFE, or other insulators to prevent galvanic corrosion. Protective paint systems applied to connections, shelf angles, and steel lintels should consider possible exposure to UV rays, which can cause epoxy paints to break down. In these conditions, additional topcoat materials such as polyurethane may be appropriate.

Construction Considerations

Installation and inspection of the cladding connection should be considered when designing connections to steel framing, and adequate space should be provided to install and inspect connection components. For example, bolted connections between the exterior face of spandrel girders and the interior face of cladding require access to both sides of the connection to install, tighten, and inspect bolts.

Discontinuous steel members with gaps to allow access or temporary access openings in continuous steel members are strategies to permit connection installation and inspection. If structurally acceptable, access openings can be left open to permit future inspection and maintenance of connection components.

Fig. 6.

Fig. 7.

While cladding and joint tolerances vary by type, many cladding systems, such as fabricated stone or glass panels, have much tighter tolerances than steel construction. Connection designers must consider the cumulative variations in the steel structure between floors and between cladding joints relative to the fabrication and installation tolerances of the cladding components. Connections should provide adjustability to take up this difference and allow the more tightly controlled components to be installed correctly.

Section 7.12 of the AISC *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22) provides requirements for structural steel tolerances, and cladding tolerances should be coordinated with the architect and cladding manufacturer. Field adjustability can be achieved using slotted holes in bolted components or field-welded components. Field-welded components or bolts that are pre-tensioned or designed as slip-critical to limit out-of-plane movement of the cladding system must provide for relative movement in other directions through the remaining connection detailing.

It is critical to ensure that cladding connections to steel buildings meet local building codes, standards, and regulations pertaining to structural integrity, fire safety, weather and wind resistance, and other environmental considerations. The connection design must also consider the expected performance and service life of the cladding system, structural steel system, and overall building. By addressing these considerations systematically, designers and engineers can effectively integrate the exterior cladding with steel structures while ensuring structural integrity, weather resistance, and aesthetic appeal of the building envelope. ■

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Steins Sell Steel

INTERVIEW BY GEOFF WEISENBERGER

Gary Stein has guided the steel distribution company his father founded from a one-location operation into a market leader.

GARY STEIN'S first foray into the family business came before his age had two digits.

An elementary school-aged Stein felt inclined to help his father, Bruce, around the material yard at Triple-S Steel Supply. Bruce founded the Houston-based company in 1960 as a small new and used steel yard. Gary learned every corner of it as a boy and started work there full-time immediately after graduating from college. Save for a summer spent working at a camera store, Triple-S is Gary's lone place of employment.

Stein had no obligation to join the family business when he reached working age, but he did almost immediately. And his father bestowed him with significant responsibilities. Two days after graduating from the University of Texas in 1983, Stein was named president at age 22 in a move he did not see coming. At the time, Triple-S still had one location.

Since then, Stein has overseen its growth into one of the country's largest steel service centers and distributors, with locations in all four U.S. time zones. He has served as CEO for more than 40 years and has been on the AISC Board of Directors since 2017. He spoke with *Modern Steel* about his career path, his experience leading Triple-S, and more.

Describe your family history in the trades.

It's a family legend that we have ancestors who were blacksmiths in Russia long

ago. We have one picture of an ancestor who was a blacksmith. My grandfather Johnny Stein was in the scrap metal business. He founded a company called Dixie Iron and Metal Co. in 1932. My father is still in the steel business at 86 years old. My family has been in the steel business for so long, we joke that when we stand in the rain, we rust. It's now a four-generation story.

What was compelling about working in the family business?

My father wanted a nice business that made a living for his family and didn't want a big business. I've seen many companies where a dad and son fight and fight and ultimately split because they can't work together. My dad didn't want that. He told me to run with it, and if you fumble, I will be behind you to pick it up. That was visionary, empathetic, and loving. I see him almost every day, and I saw my mother every day (she worked as our credit manager) until she passed away about 11 years ago. A family business can be a blessing or a curse, and we're blessed.

Now, we're figuring out how to do this with the next generation of our family. However, no one will graduate from college and become the president of Triple-S on the first day. We have told all the members of our family's next generation that nobody gets their first job here. Get hired somewhere, learn what it's like to work, and bring something back to this company. Two members of the next generation work for us: my oldest son and one nephew.

I have two brothers who have spent time in the business, but only one is still active in the company today. About 16 years ago, my middle brother, Brad, came to me and said he wanted to do something different. My other brother, David, and I spun off what was then our fabrication accessories business to him, and he is still a shareholder in Triple-S. David and I partner in Triple-S and own shares in Brad's company, TS Distributors, and he owns shares in ours.

Did any of your kids want to be an engineer or architect?

No, but I encouraged one of my sons to study engineering. He got a degree in computer science, so he did computer engineering. He has his own startup now.

What role does Triple-S fill in the industry and how do you navigate it?

We're merchants. We buy steel, we sell it, we keep big inventories. We do processing, plate burning, drilling, sawing, shearing, and bending. Of course, we don't make steel. We aren't a mill. For us, steel comes off the truck or a railcar, goes into our inventory, and ultimately goes back on a truck. Our customers create things. They build baseball stadiums, warehouses,

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**.

airports, hospitals, schools, and other great structures. They see the fruits of the labor of their hands. We don't get to do that—we just do a little processing and load steel onto a truck.

We have supplied steel for lots of great buildings, but when it left our shop, it was a just truckload of beams or other shapes. In a way, I'm envious of fabricators. I've always wanted to be a fabricator. But that's what our customers do. We buy a lot of companies, but we'll never buy a fabricator. Most of what we do involves cutting. We manufacture metal deck at one plant, but we don't weld anything. That's the Rubicon we won't cross.

You once said you're not an executive; you're a salesperson. When did you figure out you were good at being a salesperson?

I'm not sure I was good at it when I said that, but that's what I was. When I was growing up, Triple-S was my dad and two guys loading trucks. That was the whole company. I remember being six or seven years old and seeing people come to our yard and ask for a piece of plate to fix a tractor. I'd help them find that piece of plate in our yard, because that's what it was—just a yard.

I like helping people solve their problems. It's not about writing an order and making a margin. It's about helping people solve a problem, fill a need, or creatively come to a solution. That's the fun part.

Despite what your dad wanted, the business got big. When did it feel like it grew into a major company?

We survived the wreckage of the savings and loan crisis and the collapse of the oil field in Houston in the 1980s because we were mostly a surplus steel dealer. The collapse created a lot of surplus inventories. I ran around the country and bought inventories from bankrupt companies. I'd sit in their offices with a rotary dial phone, call someone, and tell them I just bought an inventory. Let's say someone was paying $0.20 per pound for something; I'd sell that inventory to them for $0.10. It was a lot of dialing for dollars, but that's how we built some capital back then.

We grew modestly. In 1985, we opened our second store in San Antonio. In 1998, we bought a company in New Orleans, though we later closed it. In 2002, we bought most of the Texas assets of Metals USA, which is today part of Reliance, Inc. Those assets became the Intsel Steel brand, which is a key part of our portfolio today.

When we acquired Intsel, it was a great beam distributor. We didn't sell many beams when we were smaller. Acquiring the Intsel inventory shifted us from being a retail merchant to a wholesale beam distributor. In 2004, we expanded west by acquiring R & S Steel's Denver and Salt Lake City operations. In 2006, we acquired Steelco and Alta-Metal Sales & Processing in Salt Lake City. These companies, together with several others on the east and west coasts, all operate as Intsel, which is our wholesale beam division.

We have a division in Dallas called Arbor Metals, which is mostly stainless steel and aluminum. We made a small acquisition in Pennsylvania, Hillman Brass, which has mostly copper brass. But we're 85% to 90% steel.

What is your dad's role now?

He oversees our retail store operations in Houston, where we have a giant showroom. It's like an auto parts store on steroids. It has a big, long sales counter. Lots of small fabricators, welders, and contractors come to place an order, go around to the plant, and get their loads. We have 10 to 12 salespeople on this counter, and my dad runs that retail store. He's there six days a week and loves what he does.

Is there a piece of advice he gave you along the way that has stuck with you?

Love people, not things. If you treat customers right, they will keep coming back. If someone doesn't have enough money, don't take his last $5. Adjust the price and deal fairly. Make people feel good about themselves. Treat them right.

As big as we've become, we have never changed our rule of having no minimum order. Someone who might buy $10 of steel today might be your biggest customer tomorrow or next week. You never know.

What does the Triple-S stand for?

There are several answers, but one real answer. One I use all time as a joke is "Steins Sell Steel." But the real answer is the three loves of my father's life: His mother, Sarah, his wife, Shirley, and his younger sister, Sharlene.

Besides your time in Austin, have you been in Houston your entire life? What do you enjoy about it?

I have, but I probably travel 100 days a year now. I read one book—I can't remember the author's name—that calls Houston the most international city in the United States based on different populations, number of specialty restaurants, and foreign consulates. He had five or six metrics that showed we're more international than New York.

We have great weather nine months out of the year. Houston is a great place to be a student—live here from September to May and get out in June, July, and August. But on the other hand, you don't have to shovel humidity.

What is your biggest interest outside of work?

I'm a camera geek. I was a yearbook photographer in middle school. I buy lots of cameras, but I don't take as many pictures as I should. My wife wants me to take more, so I take my camera on all our trips now. We were in Kenya this past summer, and I took a couple thousand pictures.

We were in the Maasai Mara, which you might know as the Serengeti. It's the same area. It was great. I'd go back tomorrow. Out there, I could turn 360° and see four or five miles in every direction and see nothing made by man. I hadn't seen that anywhere else. It was so different than our daily lives. ■

This interview was excerpted from my conversation with Gary. To hear more from him, listen to the January Field Notes podcast at ***modernsteel.com/podcasts****, Apple Podcasts, or Spotify.*

Geoff Weisenberger (**weisenberger@aisc.org**) is the editor and publisher of *Modern Steel Construction.*

A Letter to/from the Mid-Level Engineer

BY AARON KOSTRZEWA, PE

An experienced engineer offers advice: learning experiences don't stop after a short time on the job.

IN ENGINEERING, you may be inclined to think your learning has peaked by the time you graduate college. Impressive grades can create that feeling, at least.

A first job, though, is a swift awakening to how much more there is to learn than what coursework, lectures, and exams could teach. And the realizations don't stop after a few months on the job. By the time you're a mid-level engineer, you have surely come to grasp the vastness of the unknowns. Each year, you realize that the more you know, the more you don't know.

A handful of completed projects, a PE license, and several years of experience can create an inflated sense of security in our competencies as engineers. The reality, however, is that we all have more to learn, and to think otherwise reflects a level of ignorance that should be discouraged in our industry.

In 2019, I wrote an article for *Modern Steel Construction* titled "A Letter To/From the New Engineer" (found in the May 2019 edition at **modernsteel.com/archives**). Five years later, I'm back with distilled insights based on my experiences since then that I hope will help other mid-level engineers.

I've been a design engineer for more than six years, been the engineer of record for multiple projects, and provided engineering services across various industries. I am experienced by some measures. I can lead and stamp complex projects. I think I'm a good engineer. At the same time, I've made countless mistakes; fewer with each year, but more than I'd like given my experience level.

Mistakes are not solely bad, though. Projects reveal lessons you hadn't learned as much as they affirm concepts you know. Often, there is no way to gain experience and grow other than working through challenges on a variety of projects. The more knowledge we gain, the better equipped we are to ensure the structural system is safe. Mistakes may happen, but with experience, their consequences should become less severe.

The inflated sense of competence after a few years in the workforce is especially prevalent if you've become more specialized. Comfort—sometimes too much comfort—can creep in the more familiar you become with a certain area. You may have done something correctly many times before, but it does not make you infallible. Are you becoming complacent with tasks you've repeated many times? Do you take extra care when branching into unfamiliar territory?

Engineers constantly juggle deadlines, multiple tasks, and overlapping projects. Rarely do we have the time to analyze every detail to the degree we'd like. Instead, external constraints force us to allocate just enough time to reach a minimum confidence level that a structure is safe. When we're pressured to spend less time on analysis and review, we should raise a red flag because we lack sufficient confidence in the structure's safety. Beyond the minimum threshold, diminishing returns set in (unless value engineering is being performed). The discerning engineer must know how to expend time accordingly to navigate projects efficiently and safely.

Consider a mid-level engineer about to stamp his first set of drawings. He has met his state's requirements to receive a PE license, his employer entrusts him with the competence to take on liability, and he's designing to code-prescribed minimum loads. But he has an incomplete understanding of the codes and specifications related to his scope of work. In any moderate-sized drawing set, there is likely to be an error—perhaps a typo, formatting issue, incomplete information, or worse, a structural mistake. He arrives at this epiphany as he inks his stamp for the first time.

Still, he stamps and seals his first set of drawings, stating to the relevant parties that he approves them for their intended purpose and guarantees them with his license and reputation. Often, he will certify them for structural integrity as well, which is no daunting task when considering all the minimums that must be reached. But structural integrity isn't guaranteed. Applied loads aren't guaranteed. Perfect knowledge of the as-built condition isn't guaranteed. Material properties aren't guaranteed.

The mid-level engineer should approach an engineer of record responsibility with humility. Though he has understood those lack of guarantees at various points in his career, the weight of responsibility demands a renewed sense of caution and skepticism. Mid-level engineers should critically review their work, the work of those under them, and every individual who builds off stamped drawings. After all, we are imperfect individuals attempting to create flawless 2D and 3D designs on a computer, only to see those designs become imperfect products when executed in the field.

My message to engineers who consider themselves experienced and good is to understand your knowledge is finite. You will make mistakes. Take every opportunity for additional review. And when (not if) mistakes arise, acknowledge them quickly and without hesitation.

We have the incredible privilege of building the world. We are responsible

for acting ethically in an industry that always needs more integrity. And we can influence the next generation of engineers—a source of pride for the practicing engineer. We design for events that might only occur once in the lifetime of a building, but when that storm hits, I want to be standing in the building I engineered. ■

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Macy's Makeover

BY JOHN BRUNNER, PE, TOM SOELL, PE, AND HILLARY NICHOLAS, PE

James Stukenberg

UPON INITIAL GLANCE, there is little similarity between a building designed to be a department store and an office building.

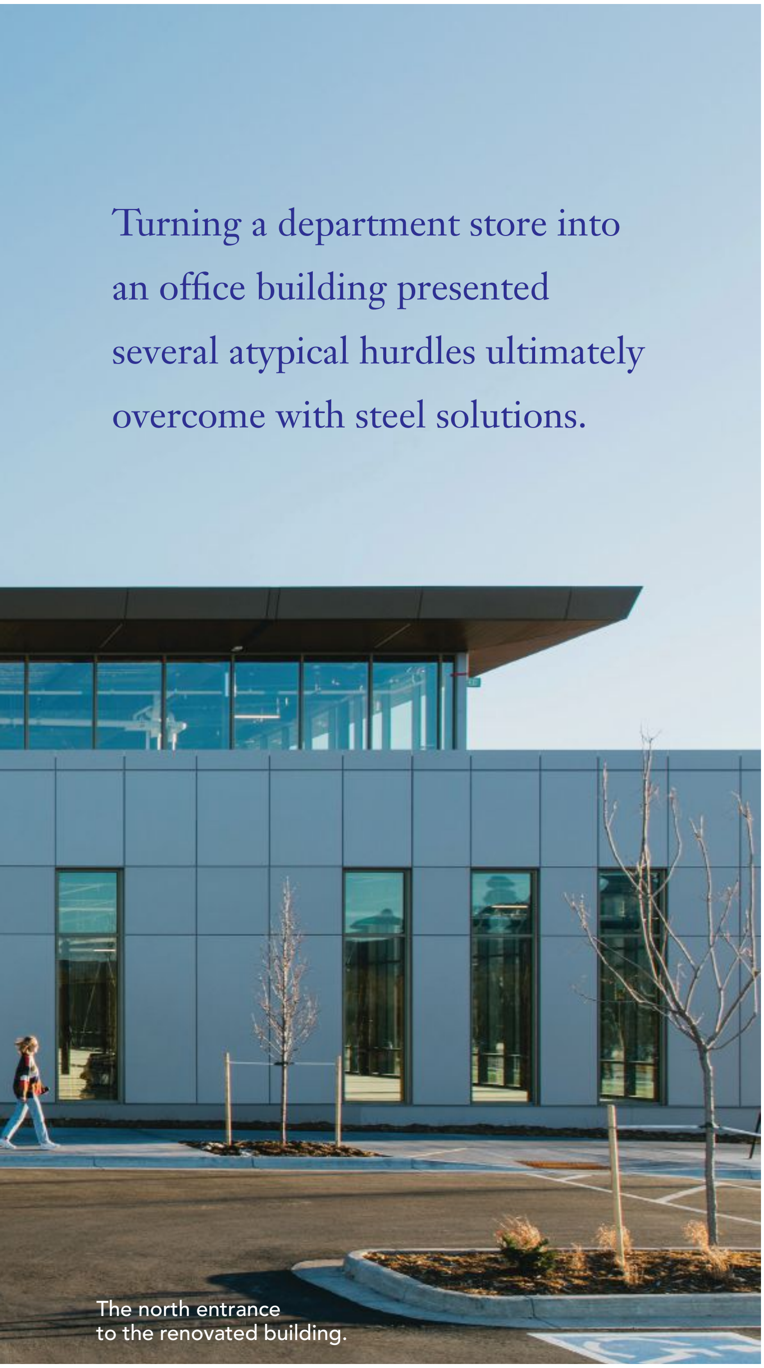
Department stores that anchor shopping malls lack windows, individual suites, and amenity spaces. They're usually not in business districts. They have high ceilings and floor-to-floor heights not frequently found in office towers.

That didn't stop one city and project team from transforming an anchor department store into an office building—and proving it's worthwhile.

Boulder 29, a new Class A office building, is a daring and creative adaptive reuse of a former two-story anchor store at a mall in Boulder, Colo. A project team led by structural engineer JVA, architect Shears Adkins Rockmore (SAR+), and general contractor Saunders Construction reclad, renovated, and added a level to the 40-year-old building, creating prime office space with exceptional views of the foothills and Boulder's iconic flatirons.

The original 155,000-sq.-ft big box store contained approximately 500 tons of structural steel and steel joists, 175 of which were removed and recycled. The adaptive reuse saved and repurposed over 325 tons of steel. In final form, floor areas on the lower two levels were slightly reduced to just over 60,000 sq. ft apiece, while a new third level added 30,000 sq. ft each of floor and roof. The project added 400 tons of new steel, with about 150 on the new third floor, 100 in the new roof, 25 at a plaza infill, 25 for plaza canopies, and the remainder for braced frames, floor infill, roof strengthening, and miscellaneous steel wall framing.

Turning a department store into an office building presented several atypical hurdles ultimately overcome with steel solutions.



The north entrance to the renovated building.

A sunken courtyard and a glass façade were two additions to the former Macy's building.

Starting Early

The original two-story building, a May D&F department store, was constructed in 1982 during a major expansion of the indoor Crossroads Mall. In 1989, a two-and-a-half bay addition was constructed on the building's east side. Years later, Macy's assumed store ownership. In 2005, the adjacent indoor mall was torn down and replaced with an outdoor pedestrian mall called Twenty Ninth Street. The Macy's south entrances were reconfigured to connect to it, with a new main entrance to the open-air mall at Level 2 and a secondary entrance at the Level 1 parking garage.

During the summer of 2018, years before Macy's closed, SAR+ approached JVA about a secret project in Boulder: turning the building into an office. The project remained covert while the owner and developer sorted through obstacles like budget reconciliation, city approval, and unforeseen pandemic challenges. Permit and construction drawings were issued in July 2021, the store closed in early 2022, and demolition began that April.

Structural drawings were available for the original building and the 2005 entry modifications, but not for the 1989 addition. The original building was steel framed with a typical 28-ft square column grid, and after the 1989 expansion, had a 280-ft north/south dimension and a 270-ft east/west dimension.

The original framing was metal deck and steel joist at the roof, with composite steel beams supporting a concrete slab on metal deck at Level 2. Building columns were typically W8 steel sections supported on shallow spread footings with an allowable bearing

The building has entries on multiple levels because of the site's grade change.

James Stukenberg

pressure of 5,000 psf. Floor-to-floor heights for the building were 17½ ft, a rare project where above-ceiling space was not at a premium. Due to grade change across the site, entry to the building was at Level 1 on the east side and at Level 2 on the west, resulting in a basement wall on the west side and around the corner on the north side.

The major design changes in the adaptive reuse were:

- Adding a partial third floor on the west side at the existing roof level with a wrap-around deck.
- Removing the westernmost bay from ground to roof to create a below-grade courtyard. Along with two new interior light wells, these modifications allowed natural light into the interior and lower levels of the building.
- Removing all the existing steel braced frames and installing a new lateral system. Many existing braces were in locations slated for demolition, and none of the angle or channel braces met aesthetic goals for being exposed.
- Removing the entire existing exterior cladding, replacing a windowless brick façade with a combination of curtain wall and sculpted metal panels.
- Demolishing an exterior escalator and roof in the public plaza south of the building. Openings in the existing precast concrete structure were infilled with structural steel.

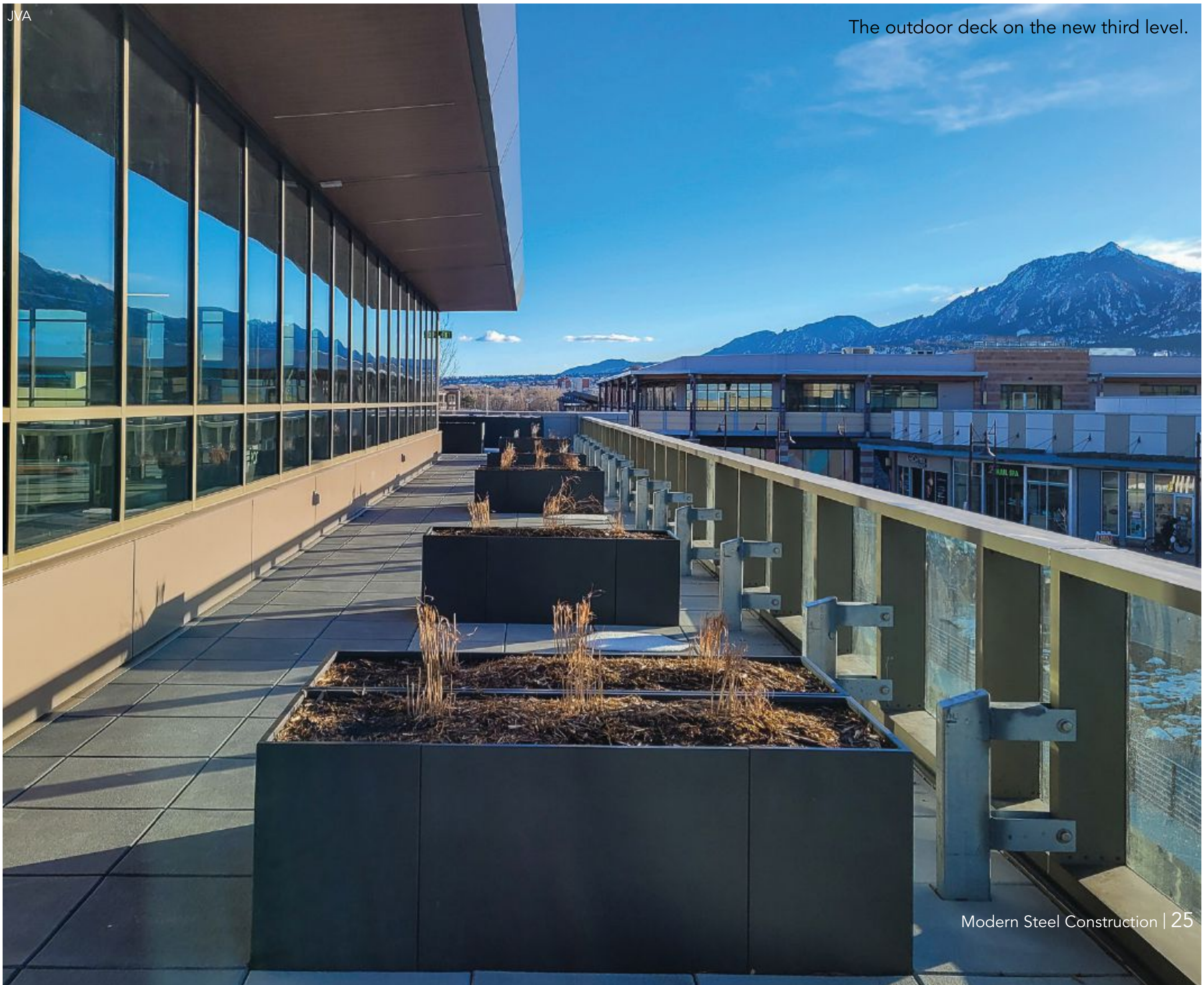
The entire existing structure was modeled in Revit early in the design process. Phasing, demolition, and filtering features were used to facilitate visualization and coordination of design options, load path, and geometry. Because the 1989 addition drawings were unavailable, JVA extrapolated from the original drawings and made assumptions on framing sizes and layout for the addition. Frequent site visits helped document the general arrangement of framing, but the finishes, hard ceilings, and an operating store made precise information difficult to obtain. Once the changes and additions to the building were narrowed down, the Revit model was exported to RAM Structural System (RSS). The resulting building analysis model was used to design new members, check existing members, and perform final lateral load analysis.

While the store was still occupied, the Saunders Construction survey team worked nights laser scanning the structure above the ceiling. The resulting point cloud was linked into the building model and confirmed as-built conditions along with valuable missing information.

LeJeune Steel (fabricator and detailer) and Total Welding (erector) were brought on during design, and their early participation proved invaluable to developing connection details that were efficient and constructable. Weekly meetings between Saunders, SAR+, LeJeune, Total Welding, and JVA started in the design phase. They involved schedule and pressing coordination issues, uncovered conditions that conflicted with drawings, and discussed anything else that required collaboration. The upfront effort to avoid rework helped achieve zero structural steel field fit-up issues and ensured every new/existing column splices and floor framing connection was erected as drawn.


JVA

Grade change on the site meant putting building entrances on two levels.


JVA

The outdoor deck on the new third level.

The existing roof steel sizes were inadequate for floor loading, meaning the added third level needed new framing.

JVA

An outdoor escalator was removed and filled in to improve connection with the rest of the mall.

JVA


The old windowless brick façade was replaced with a curtain wall and sculpted metal panels.
James Stukenberg

Loading Labor

Converting the western two-thirds of the existing roof into a new third level was the most dramatic structural change, because adding another floor level significantly increased column and foundation loads. The existing columns were typically two-story continuous W8s and, in most cases, were adequate above Level 2 for the new loads. Below the second floor, columns had an increase in load of up to 40%. Steel plates were stitch-welded between flange tips to create box sections where the original A36 steel columns were overloaded. The plates increased the weak axis moment of inertia and radius of gyration, which greatly increased allowable stresses on relatively slender W8 columns.

For the increase in foundation loads, project geotechnical engineer CTL | Thompson confirmed the soil had a total load-bearing strength capacity exceeding 7,000 psf, but also potential for increased settlement. Fortunately, the existing footings were thick enough and had adequate reinforcing to satisfy the higher bearing pressures' punching shear and flexural strength requirements.

In general, column loads and increases were consistent between columns in the north/south direction but varied from west to east. The new west exterior face of the building was previously an interior column line; therefore, the increased number of stories and deck loads was roughly offset by a reduction in tributary area, resulting in no substantial change in soil pressure.

The next full interior bay had the largest increase in load due to the new Level 3 deck. Moving east, typical columns under the vertical expansion had relatively uniform loads and bearing pressures until dropping off at the east side of the third floor.

Based on relative settlement estimates from CTL | Thompson and discussing movement risk with the owner, footings at the first interior column line were enlarged to smooth the increase in bearing pressure and potential settlement over two 56-ft bays. Similarly, on the east side of the new third floor, the half-bay of added floor load averaged the bearing pressure increase over two bays.

Roof Reconfiguration

The existing roof had a central ridge, with structure sloping and warping to roof drains at low points on the west and east sides. The steel sizes were inadequate for floor loading and at the wrong elevation, leading to all new steel framing for the Level 3 floor. Because of the two-way sloping of the existing framing and a combination of steel girders framing over and into columns, the top of the existing column elevation was unique at every grid. Framing elevations drawn at each grid show new, existing, and demolished steel to communicate the complex geometry. Details were developed to address the multiple floor beam and girder connections and how they related to the splice of the existing and new columns.

On the east side of the third floor, drifting snow from the new higher roof increased loads on the existing roof deck and joists. To address the higher snow loads, new members were installed between existing joists, cutting the deck span in half and reducing the tributary load to the joists. The contractor was given the option of salvaging steel joists from the demolished part of the roof and reinstalling them in the drift areas, but installed new steel beams instead because carefully demolishing, storing, and erecting the joists without removing the deck was a laborious proposition. In a few areas, drift loads were large enough to require strengthening of steel beams supporting joists—accomplished by stitch-welding shallow wide-flange sections to the overloaded beams' undersides.


Soil anchors for the sunken courtyard.
JVA


JVA
New bracing for the sunken courtyard.

Lateral System and Lighting

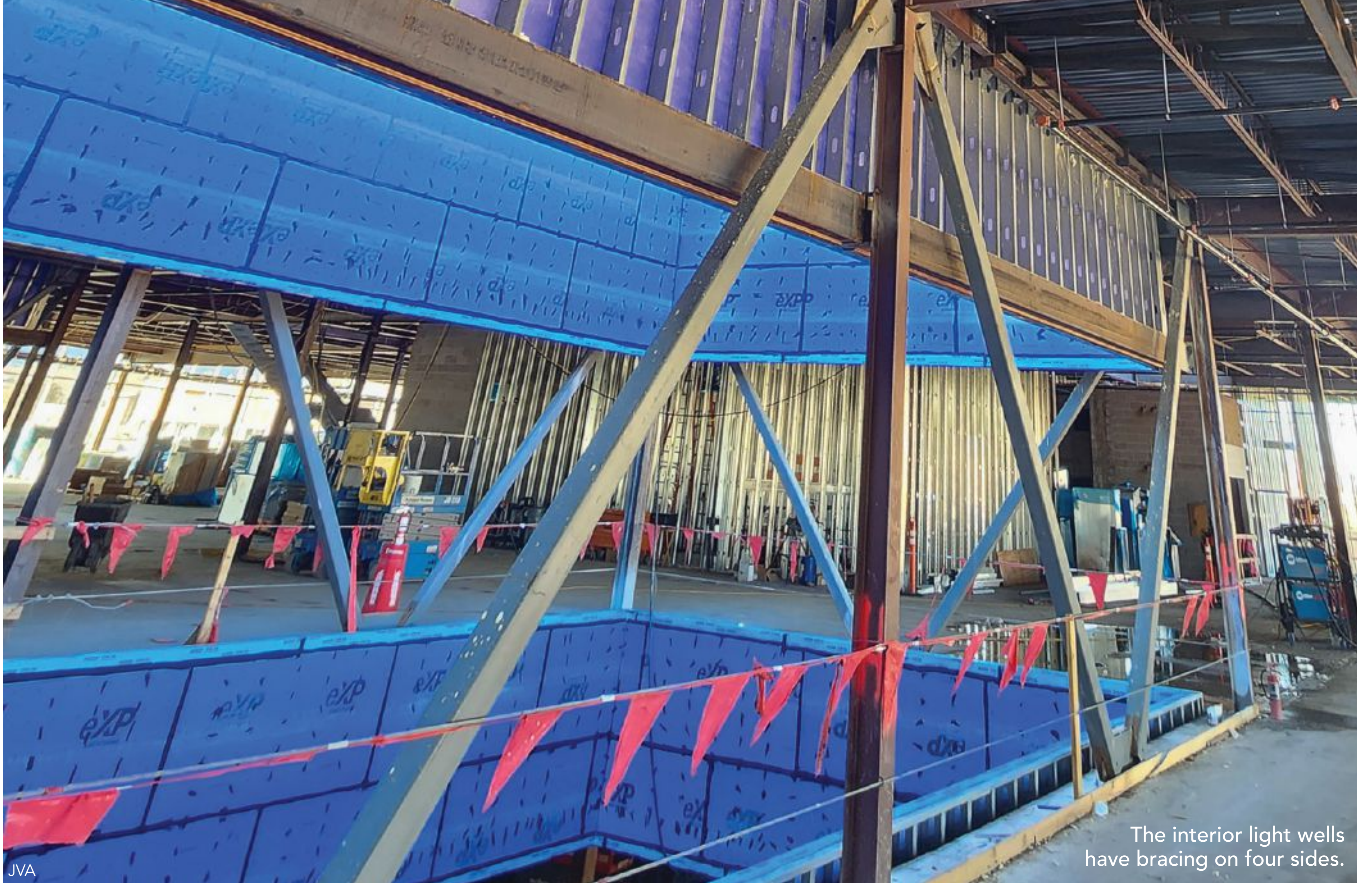
The building lateral system was replaced in its entirety. Existing steel bracing around the building perimeter was in bays slated for demolition or unsuitable for exposure. JVA proposed concrete cores at the stairs and elevators, but Saunders pushed back for cost and schedule reasons. Exposed steel bracing aligned with the building's aesthetic, but the challenge was adding and locating it so existing steel members, foundations, and connections could be used with little to no modification or strengthening.

Twelve braced frames eliminated the need for modifications and strengthening and were placed on all four sides around the exterior and around interior light wells. At most locations, multiple bays were braced to spread out the overturning and to keep column jamb forces small. The uplift on what were originally gravity columns and footings was held near zero. Additional anchorage of columns to footings was required to transfer shear forces, but no foundations needed enlargement or modification.

Bringing light into the previously windowless building required existing bays to be demolished. Taking out the westernmost bay moved the new building face away from the property line and created a public courtyard at Level 1, one story below the adjacent grade. While the existing basement wall had a retaining-type footing, it did not have the strength or stability to function as a standalone cantilevered retaining wall. Before demolishing the Level 2 slab bracing at the top of the wall, two rows of permanent soil anchors were installed through the wall to resist sliding and overturning.

Daylight was also infused by adding two 28-ft by 56-ft light wells near the north/south centerline of the building, creating ground-level courtyards open to the sky. At the east well, existing roof and floor decks and framing were demolished. At the west well, two bay openings in the new roof and third floor were stacked above a new opening in the Level 2 framing. The exposed braced frames on all four sides of the light wells help resist lateral loads and minimize uplift forces.

The exterior steel stud walls and light-colored brick veneer were demolished. Due to material changes, energy code, insulation, and improved exterior envelope assemblies, the new metal panel and curtain wall system did not match the thickness of the existing one. The existing concrete foundation



JVA

The interior light wells have bracing on four sides.

wall was thickened on the outside face, allowing the metal wall studs and curtain wall to bypass Level 2 and the roof rather than being infill framed as in the original construction.

Structural work on the east side (the 1989 addition) was largely limited to new bracing and exterior walls; most of the roof and floor remained with only minor modifications. Demolition of the undocumented exterior walls in the 1989 addition revealed that the perimeter details were changed from the original 1982 construction. The original roof edge beams were moved off the column centerline and were connected to the inside column flange, allowing the wall studs to cantilever past the roof to form a parapet. That discovery birthed the need for revised bent plate sizes at the roof, along with revisions to braced frame gusset plate connections and the connections of members used to drag load into the frames.

To improve connection with Twenty Ninth Street, the public plaza south of Boulder 29 at Level 2 underwent a renovation that included removing escalators that connecting to parking below and their canopy roof, followed by infilling the escalator opening. The plaza was precast concrete, but Saunders' preferred to infill the opening with steel beams and slab on metal deck.

Based on recollection of a decades-old conversation, JVA reached out to Front Range Design Group (FDG), a local precast specialty design firm, for information on the plaza. FDG did the original engineering design and had design calculations and shop drawings. FDG analyzed existing precast members for infill loads provided by JVA, and in a direct, assumption-free process, determined that the precast was adequate for the steel infill loads.

Converting a two-story retail building to a three-story office building is a novel idea, and it brought concern over the difficulty of translating the structural design through the construction phase to the built structure. However, the partnership and collaboration between the design and construction teams led to a project smoother than anyone's reasonable expectations. The successful building transformation saved and repurposed hundreds of tons of steel and other building materials while prolonging the life of a structure in the heart of Boulder. ■

Owner
Corum

General Contractor
Saunders Construction

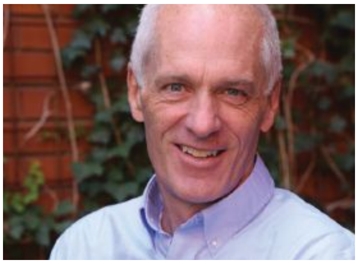
Architect
SAR+

Structural Engineer
JVA Consulting Engineers

Steel Team

Fabricator and Detailer
LeJeune Steel (AISC Certified Fabricator)

Erector
Total Welding, Inc. (AISC Associate, AISC Certified Erector)



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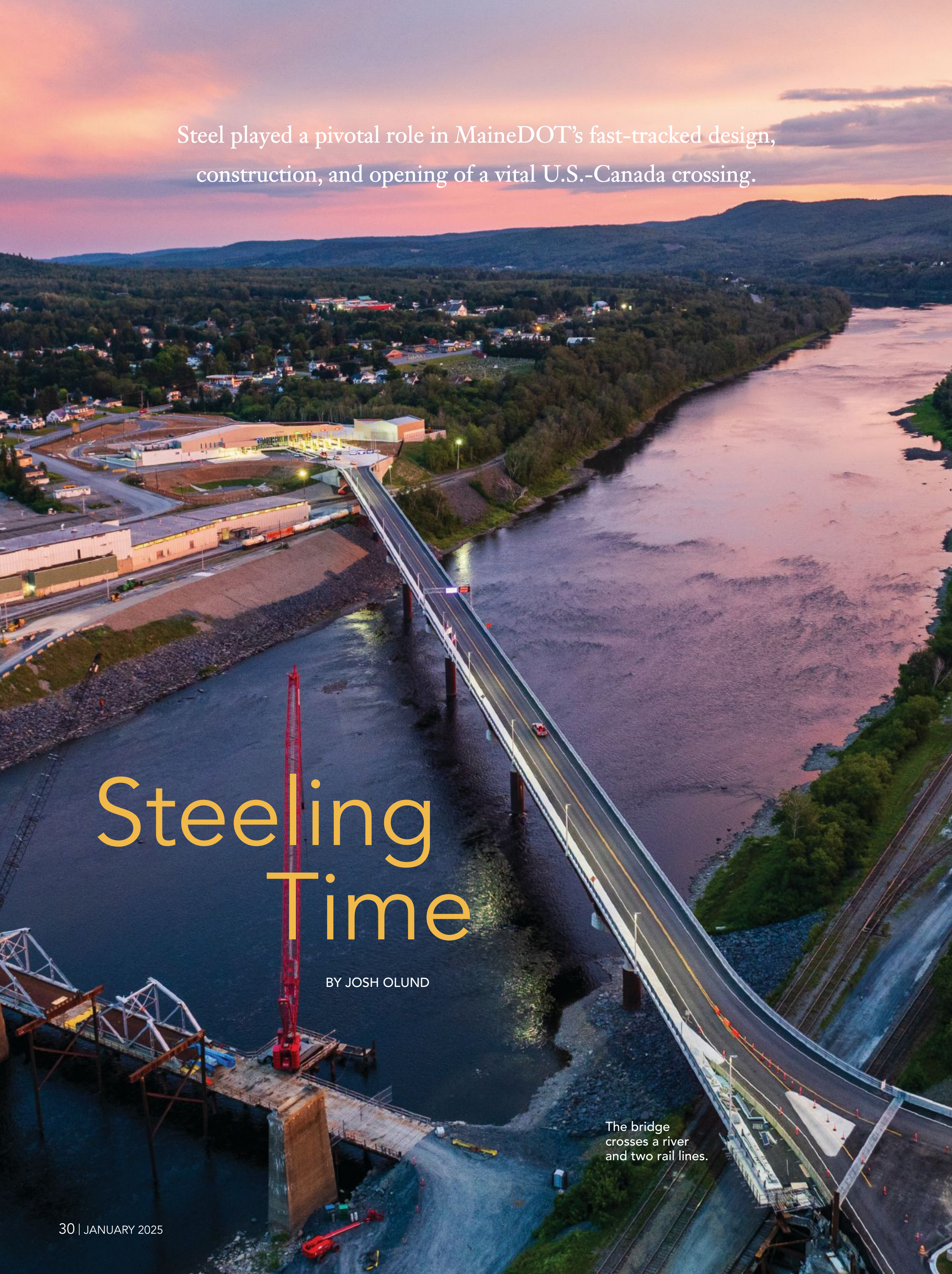

Steel played a pivotal role in MaineDOT's fast-tracked design, construction, and opening of a vital U.S.-Canada crossing.

Steeling Time

BY JOSH OLUND

The bridge crosses a river and two rail lines.

The new bridge is built at a 45° angle and is nearly twice as long as its predecessor.

All photos courtesy of Deschaine Digital via HNTB

STEEL WAS THE CHOSEN MATERIAL for the original bridge over the St. John River between Madawaska, Maine, and Edmundston, New Brunswick, which opened in 1921.

A century later, it was also the choice for the replacement.

The Madawaska-Edmundston bridge is more than a commercial corridor and U.S.-Canada crossing. Many residents have family members on each side of the bridge. Some live on one side and work on the other. The towns share some public services, such as waste removal and emergency services. To mitigate the significant hardship a decades-long bridge replacement project would create on the area, the Maine Department of Transportation (MaineDOT) implemented an ambitious campaign that allowed the new bridge to be designed in two years and constructed in less than four years.

MaineDOT partnered with structural engineer HNTB to evaluate alternatives and rapidly design the replacement bridge. After narrowing the options to a steel girder bridge and a cast-in-place segmental concrete bridge, HNTB submitted plans for the preferred alternative: a six-span steel girder bridge selected for its reduced construction risk, cost, and time savings.

Design and constructibility decisions considered several factors. The new bridge site was on a steep, unstable valley with heavily fluctuating river levels. The bridge needed to be built with access through and around an active paper mill with operations on both sides of the St. John River, two independent railroad yards, and a highly secure, active international border crossing.

The site complexity was further compounded by construction of a new U.S. Land Port-of-Entry (LPOE) facility a quarter mile upstream from its current location and a redevelopment of the Canadian Port of Entry (POE) site to align with the new north end of the bridge. All told, three major concurrent construction projects were occurring in a half-mile area.

The new U.S. LPOE location also meant the new bridge would need to be nearly twice as long as its predecessor so it could tie into the existing Canadian POE, stretch across the St. John River at a 45° angle, and connect to the new U.S. facility. Because the bridge linked two port facilities, access for maintenance would require heightened coordination from both countries. Therefore, it was specified that the new structure be constructed of durable, sustainable materials to reduce the need for frequent maintenance.

The constrained site, access challenges, and active rail yards contributed to MaineDOT's decision to select the steel design. Weathering steel also reduced maintenance and ensured surrounding communities would have a new bridge with a 100-year service life.

The new bridge is constructed with some of Maine's longest steel girder structure spans, at 315 ft, contributing to the bridge's longer-than-average length of 1,828 ft. It's comprised of 3,750 tons of structural steel, nine tons of shear studs, and 972 tons of rebar.

The bridge site is on a steep valley with fluctuating river levels.

Cost Flexibility

As the bridge advanced to final design, MaineDOT activated its contractor-in-design constructability assessment, a best practice reserved for large, complex projects. Three prospective builders provided input on project site access, staging locations, foundation types, construction risk, and project schedule, among other items.

One concern the contractors raised was how to bid the price of steel. The pandemic, which hit during the final design phase, had dried up supply chains and sent materials costs skyward. To ensure the bridge would have the necessary 3,750 tons of steel when needed, MaineDOT added a steel escalation clause to the yet-to-be-advertised contract that allowed the contractor to develop its bid based on current U.S. prices. If, at procurement, steel costs were higher than the winning bid anticipated, MaineDOT would pay the difference.

Five Foundation Types

With the contractor's input, the design progressed efficiently and was rapidly completed. Final design began in February 2020, and by December 2020, HNTB submitted 100% complete plans for a simplified, six-span continuous structure with four variable-depth steel plate girders and a composite cast-in-place concrete deck with two lanes.

The 315-ft spans are among Maine's longest steel structure spans.

The plan included five foundation designs and a foundation bid alternate for the piers. The pier bid alternates included drilled shafts and spread footings based on the bedrock 30 ft below the riverbed. Contractors were invited to bid on the foundation type of their choice, considering constructability and cost.

U.S.-based Reed & Reed, Inc. submitted a bid and won the contract in March 2021. When steel procurement time arrived, costs had escalated. Reed & Reed's bid included five foundation types to meet the site's conditions based on the ability to get construction equipment to each pier, construction laydown, and surrounding geotechnical requirements. Construction of the steel bridge began a month later.

All steel used on the bridge was fabricated in South Portland, Maine, thanks to MaineDOT's negotiation with New Brunswick to include the Buy America provisions clause in the construction contract. The bridge's I-shaped plate girders are made with AASHTO M270/ASTM A709 Grade 50W and 70W uncoated weathering steel, with the ends of the beams adjacent to expansion joints painted to avoid early onset corrosion.

For the girders over the piers, HNTB chose higher strength 70-ksi steel, which allowed for significant bending forces induced by the beams flexing over the piers instead of making the beams deeper. The stronger steel allowed the girders to be about 10 ft deep, eliminating the need for the longitudinal splicing required for deeper girders to accommodate shipping clearances.

Other steel components include connecting members, corrosion-resistant stainless-steel rebar in the bridge deck and most of the abutments, traditional rebar throughout the remaining piers and abutments, and a rare decision by MaineDOT to add steel casings around the pier columns to aid with formwork and long-term ice damage protection.

Three-Year Construction Phase

Reed & Reed crews worked on the Maine abutment through the harsh northern Maine winter in 2021–22 and wrapped up the three hammerhead piers in the summer of 2022. Canadian subcontractor Greenfield Construction finished two piers and the New Brunswick abutment simultaneously.

Crews erected the structural steel girders in late August 2022 and finished that work in March 2023. To facilitate the accelerated schedule, Reed & Reed erected its first girders in pairs, a carefully planned and choreographed process. The paired girders weighed more than 185 tons, but skilled operators and ironworkers made the two-crane lifts look easy.

Upon completion of the steel erection, crews built the forms for the concrete deck. After the deck work was completed, work began on the sidewalk, railings, lighting, and paving.

MaineDOT opened the new $97.5 million six-span steel girder bridge to all vehicles in June 2024. The new bridge features wider 12-ft travel lanes, 6-ft-wide shoulders on each side, and a 6-ft-wide raised sidewalk on the downstream side to facilitate the safe

The I-shaped plate girders are made of Grade 50W and 70W uncoated weathering steel.

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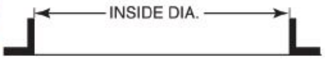
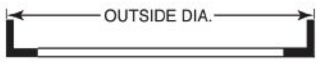
1 Angle Leg Out



10" x 10" x 1" Angle

2 Angle Leg In

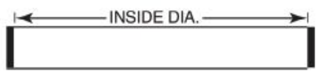


10" x 10" x 1" Angle

3 Flat Bar The Hard Way

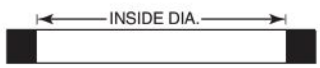
24" x 12" Flat

4 Flat Bar The Easy Way



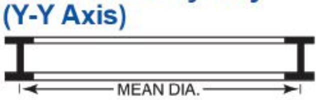
36" x 12" Flat

5 Square Bar



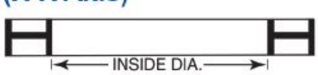
18" Square

6 Beam The Easy Way (Y-Y Axis)



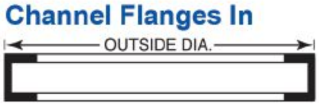
44" x 335#, 36" x 925#

7 Beam The Hard Way (X-X Axis)



44" x 285#

8 Channel Flanges In

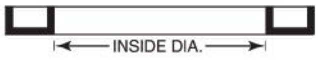


All Sizes

9 Channel Flanges Out

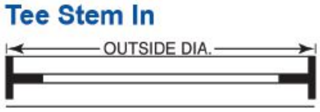
All Sizes

10 Channel The Hard Way (X-X Axis)



All Sizes

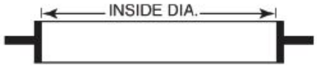
11 Tee Stem In



22" x 142 1/2# Tee

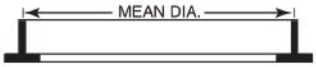
We bend ALL sizes up to:

12 Tee Stem Out



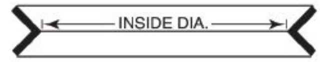
22" x 142 1/2# Tee

13 Tee Stem Up



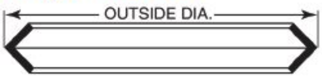
22" x 142 1/2# Tee

14 Angle Heel In



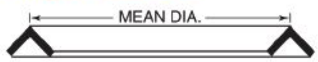
8" x 8" x 1" Angle

15 Angle Heel Out



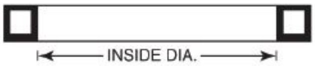
8" x 8" x 1" Angle

16 Angle Heel Up



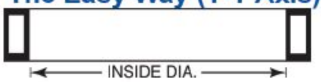
8" x 8"x1" Angle

17 Square Tube



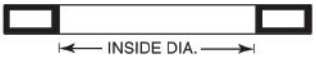
24" x 1/2" Tube

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



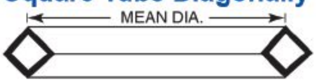
20" x 12" x 5/8" Tube

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



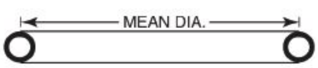
20" x 12" x 5/8" Tube

20 Square Tube Diagonally



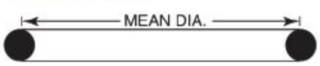
12" x 5/8" Square Tube

21 Round Tube & Pipe



24" Sched. 80 Pipe

22 Round Bar



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The new bridge opened to traffic in June 2024, and deconstruction of the original bridge is underway.

movement of pedestrians and cyclists. At the request of the public, aesthetic elements include ornamental railing, long-lasting LED lighting, and three flag poles to represent each country and the First Nations insignia, representing the local indigenous community that first inhabited the region. ■

Owners
Maine Department of Transportation
New Brunswick Department of Transportation and Infrastructure

General Contractor
Reed & Reed, Inc.

Structural Engineer
HNTB

Steel Team

Fabricator
Casco Bay Steel Structures, Inc.

Detailer
Tensor Engineering Co.

Josh Olund (jolund@hntb.com) is the HNTB project manager for the Madawaska-Edmundston International Bridge Replacement Project.

Thorough preparation in advance of a certification audit is the best way for fabricators and erectors to reduce nervousness about it.

At Ease

BY TERRY MCMILLIAN

Greg Folkins

IN EIGHT YEARS of performing AISC certification audits for Quality Management Company (QMC), I have found that one common cause of nonconformances is actually easily correctable.

Often, nonconformances found during the audit process stem from a company's lack of preparation and understanding of an audit's ins and outs. But audit readiness information is accessible online, and it makes preparation simple.

A mere Google search can uncover some of the necessary information and answer questions. For deeper understanding and preparation, though, AISC provides several free downloadable resources at **aisc.org/certresources**, including a sample of a management review meeting form and an internal audit guide. These tools will aid the development, improvement, and maintenance of a quality management system (QMS).

Think about a time you had nerves about an upcoming audit. Was it because you were not prepared to your liking or didn't understand something about the process? An audit itself and the negative connotations that come with it are enough to induce nervousness, but that will be minimal with thorough preparation.

A company's preparation starts by building and understanding a strong QMS. If the company wants to remain AISC certified, its QMS must align in some manner with the *Standard for Certification Programs* (AISC 207-23, download for free at **aisc.org/publications**). The AISC standard brings the "shalls" into play, and when a standard identifies a shall, your process must identify how you accomplish it. That's done through procedures explaining how your QMS operates and instructions to personnel.

The best way to maintain or verify QMS compliance is an audit, whether it's internal (the company audits itself), external (from certifying organizations like AISC), or both. At their core, audits are a comparison. AISC compares a company's QMS to the *Standard* to validate compliance or discover a lack thereof.

As an example, I'll dive into typical internal and external audits for a shop holding the Building Fabricator (BU) certification. It centers around the *Standard*, and AISC's internal audit guide for building fabricators (download at **aisc.org/certresources**) is a helpful additional resource.

The audit agenda says exactly what will be audited. Once you read it, you can start accumulating documentation and records needed for review during the audit. In addition to the *Standard*, you must be familiar with other codes, standards, and specifications as required and follow AISC general and supplemental requirements. For example, here's a requirement copied from section 1.3 of the *Standard*:

> "The reference documents and standards necessary to make personnel aware of work requirements shall be consistent with the requirements of existing contract documents and shall be readily available to those who need them.
>
> The ability to work to and meet the requirements of the latest edition of the following documents shall be demonstrated:
>
> (a) *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303-22)
> (b) RCSC *Specification for Structural Joints Using High-Strength Bolts*
> (c) Selected ASTM *Standards for Structural Steel Fabrication*, as published for AISC, or equivalent content
> (d) AWS A2.4 Symbols
> (e) AWS A3.0M/A3.0 Terms and Definitions
> (f) AWS D1.1/D1.1M *Structural Welding Code—Steel*"

Those codes, standards, and specifications must be available during internal and external audits. They can be hard copies or electronic, and each document's location should be clearly identified.

Greg Folkins

Every section in the *Standard* has specific requirements, and a company's procedures answer how it meets those requirements. If the *Standard* says a company "shall" do something, the company gets no vote. The process must answer how the company accomplishes the shall.

Here are some audit sections, with common audit review documents for those sections listed in parentheses:

- 1.3 References (Reference library, codes, standards, specifications)
- 1.5 Management Responsibility (Management Review – Goals)
- 1.6 Construction Document Review, Contract Review (Procedure/SOW/Estimation)
- 1.7 Detailing (Procedure, Detailing Standard)
- 1.8 Control of Documents (Procedure/records)
- 1.9 Maintenance of Quality Records (Procedure/records)
- 1.10 Purchasing (Procedure & ASL, supplier/subcontractor evaluation)
- 1.11 Material Identification (Procedure)
- 1.12.1 Welding (Procedure, WPSs, welder qualifications, welder continuity records)
- 1.12.2 Process Controls, Bolt testing demonstrations (Procedure, bolting records)
- 1.12.3 Preparation for Application of Coatings (Procedure/records)
- 1.12.4 Application of Coatings (Procedure/records)
- 1.12.5 Equipment Maintenance (Procedure/records)
- 1.13 Inspection and Testing (Procedure/documenting/I-P & final inspection)
- 1.14 Calibration of Inspection, Measuring, and Test Equipment (Procedure/records)
- 1.15 Control of Nonconformances (Procedure/records, NCR)
- 1.16 Corrective Action (Procedure/records, CAR)
- 1.17 Handling, Storage and Delivery (Process)
- 1.18 Training (Process and training records)
- 1.19 Internal Audit (Procedure/current internal audit records)

To highlight one example, in Management Responsibility (section 1.5), the audit process assesses your Management Review records and verifies all the bullet points from *Standard* Section 1.5.3 (see Box 1) were discussed at planned intervals or, at a minimum, discussed annually.

AISC also has a sample of a management review meeting document with management review bullet points, an excellent way to monitor, forecast improvement, and help identify weaknesses within your QMS. Assessing management review records is part of all audits.

Identify ALL "shalls" from the *Standard* when developing procedures. A nonconformance (NCR) to a shall is the result of a breakdown within a QMS.

For example, here are the *Standard*'s welding requirements (Section 1.12.1):

> "A documented procedure for welding shall be developed that addresses the management of:
> (a) *WPSs*
> (b) Preheat requirements
> (c) *PQRs*
> (d) Storage (including ovens), handling, and identification requirements for welding consumables
> (e) Welder, welding operator, and tack welder qualifications and qualification test records in accordance with appropriate AWS requirements
> (f) Welder, welding operator, and tack welder performance records to provide *objective evidence* that the "period of effectiveness" has not been exceeded and satisfactory performance is consistently achieved
> (g) Traceability of welds to the welders who produce them
>
> WPSs shall be in close proximity to and used by the welders, welding operators, or tack welders."

When auditing a welding process procedure, you would look for information within the procedure (or reference to) pertaining to the management of bullets (a) through (g) and remember the special note for WPS proximity. The language in the procedures provides personnel with the information needed to perform their job.

Documented Management Review

Executive management shall conduct a review of the quality management system at planned intervals, but annually at a minimum. Further, at a minimum, management review shall include assessment and documentation of the following:

(a) A summary of previous management reviews
(b) Results of any internal and external audits conducted since the previous management review
(c) Customer feedback and feedback mechanisms, identifying opportunities for improving quality
(d) Work nonconformances. Both the number and severity of nonconformances shall be assessed.
(e) Process nonconformances, including compliance with the documented procedures comprising the quality management system
(f) Effectiveness of the corrective actions taken
(g) Results of equipment maintenance and preventive maintenance, including the adequacy of equipment resources
(h) Adequacy of the training program with respect to the levels of qualification required
(i) Proposed or required modifications to the quality management system

The management review record shall include the decisions and actions required for implementation of the following:

(a) Improvement of the effectiveness of the quality management system and its processes
(b) Improvement of quality
(c) Resource needs

Records from management reviews shall be maintained in accordance with the documented procedure as required in Section 1.9.

Greg Folkins

For welding, common auditing documents include written process procedure, welding procedures (WPSs), welder qualification test records (WQTRs), welder continuity records, and welding procedure qualification records (PQRs), if required or needed. Any or all are subject to review during audits.

Remove "quality" from QMS, and the phrase becomes "management system." Think of an audit as a quality and management system audit. A management system audit validates department managers' knowledge of operating procedures within each department. The AISC representative for the company is responsible for the implementation and management of the QMS, and that person might not be well-versed in how all departments function.

For example, the purchasing manager understands purchasing better than anyone else in the company, so that person should be responsible for aligning the language in the purchasing procedure with the *Standard*. An internal audit can ensure the right person aligns the language for each procedure.

AISC's internal audit guides provide specific information from each section of the *Standard* to compare to existing procedures. If a procedure cannot properly compare to the *Standard*, it needs revision to maintain certification. Audits identify things that need to be improved, but a nonconformance does not need be to discovered to bring value. An opportunity for improvement is a means of value, and a concern can be a means to bring value.

All told, the better a company polices itself, the better audit day goes. Being prepared for an audit might make a company look forward to one instead of dreading or fearing it. Confidence in preparation lets you focus on the value you bring to the audit and what you can learn from it.

Terry McMillian (**mcmillian@qmcauditing.com**) is an auditor with Quality Management Company.

SteelDays, AISC's annual event highlighting the domestic steel industry, united all corners of the AEC field for an inside look at various links in the steel supply chain.

Cross-Country Celebration

BY PATRICK ENGEL

Patriot Erectors CEO Parley Dixon took a plunge into a dunk tank as part of a SteelDays fundraiser.

PARLEY DIXON AND HIS PATRIOT ERECTORS employees have turned their Dripping Springs, Texas, fabrication shop into a SteelDays staple that routinely attracts 150 students and professionals each fall.

Hosting a SteelDays event with presentations, shop tours, and about 15 vendor booths is a full-staff effort they're glad to undertake—even if that means Dixon, Patriot Erectors' CEO, spends an hour plunging into chilly water at the mercy of attendees' pitching prowess.

A dunk tank, added to the event about three years ago, allows any attendee to toss three softballs at a target that triggers Dixon's dowsing in exchange for a small donation to a local nonprofit. It's a highlight for all attendees, from students to partners to Patriot Erectors employees who relish the chance to dunk their boss. For Dixon, the tank and the event are a chance to help a longtime community partner and unite several corners of the steel industry.

"Our industry is all about people," Dixon said. "There's automation and robotics, but for us to do what we do, it requires people who can collaborate, share ideas, and commit to an obvious solution. We have our employees, future employees, our customers, partners, and other community members here. And we're all tied together. I'm an abundance mentality person. We can take our medium and collaborate to succeed."

The 2024 event—held October 17—was Patriot Erectors' best-attended SteelDays gathering in nearly 10 years of hosting them. It surpassed a 170-person pre-event headcount due in large part to late interest from local high schools and trade schools that found the event information on the SteelDays website (**aisc.org/steeldays**) and asked to participate. All attendees could listen to presentations on the AISC *Code of Standard Practice for Steel Buildings and Bridges* (AISC 303-22) and OSHA updates, test products and services at exhibitor booths, enter exhibitor contests, and meet steel industry colleagues.

Patriot Erectors held one of nearly 40 SteelDays events in 2024, the 16th year AISC has sponsored the weeklong celebration of the steel industry. This fall's SteelDays, once again, had events in all four time zones. Fabrication companies, Iron Workers Local training centers, or regional engineer and fabricator associations hosted most of them.

"We're proud to be in the steel industry," Dixon said. "I think steel is the coolest industry out there, and I'll always want to promote it. There's honor in the work. When we first learned about SteelDays, it was something we wanted to adopt immediately."

above: Master Steel hosted a tour of its new facility in Hardeeville, S.C.

left: Barone Steel Fabricators hosted three tours of its Brooklyn, N.Y. shop and offered an up-close look at fabrication in action.

Fab Shop Fun

This year, more than 20 AISC full-member fabrication shops hosted a SteelDays event for student groups, AEC industry professionals, the public, or a combination.

Stupp Bridge Company began SteelDays with a September 13 event that celebrated the 25th anniversary of its Bowling Green, Ky., shop with tours and presentations on current resources and Stupp's 3D modeling approach. Master Steel, LLC hosted students from a local technical college and a few engineers for a tour of its new facility in Hardeeville, S.C.

Alpha Iron invited professionals to tour its Seattle-area shop to show how it has integrated advanced technology into fabrication. Gerdau invited architects on a tour of its Cartersville, Ga., steelmaking facility. Barone Steel Fabricators, Inc. hosted three tours of its Brooklyn, N.Y. shop to give a step-by-step look at the fabrication process. BAPKO Metal, Inc. and the Structural Engineers Association of Southern California partnered for a shop tour and networking event at BAPKO's Orange County shop open to all AEC professionals, sponsored by Nucor.

"I wanted to see what goes into the process of fabricating the steel we use to design and see it in person," said Luis Carmona, a recently hired teaching associate at Cal Poly-Pomona who attended BAPKO's event. "It's a different side of the industry that I think is important to see for anyone going into design."

BAPKO Metal hosted a networking event and shop tour.

Like most years, student groups were a common target for SteelDays events. Basden Steel Corporation (Burleson, Texas), Garbe Iron Works (Aurora, Ill.), Eastern Steel Works, Inc. (Seagrove, N.C.), Steel Supply & Engineering (Grand Rapids, Mich.), Germantown Iron & Steel (Jackson, Wisc.), STS Steel, Inc. (Schenectady, N.Y.), Crystal Steel Fabricators (Federalsburg, Md.), and Lexicon, Inc. (Little Rock, Ark.) were among the fabricators to host students for shop tours. Some tours included welding lessons with a virtual welding machine. Others held hands-on training with real welding equipment. Basden Steel attendees also drilled and tightened connections.

Elsewhere, JGM Fabricators & Constructors welcomed 200 students and professionals to its Coatesville, Pa., shop for a networking event that included a hands-on welding opportunity. Nearby, High Steel Structures had about 400 students, engineers, DOT representatives, customers, and curious members of the public.

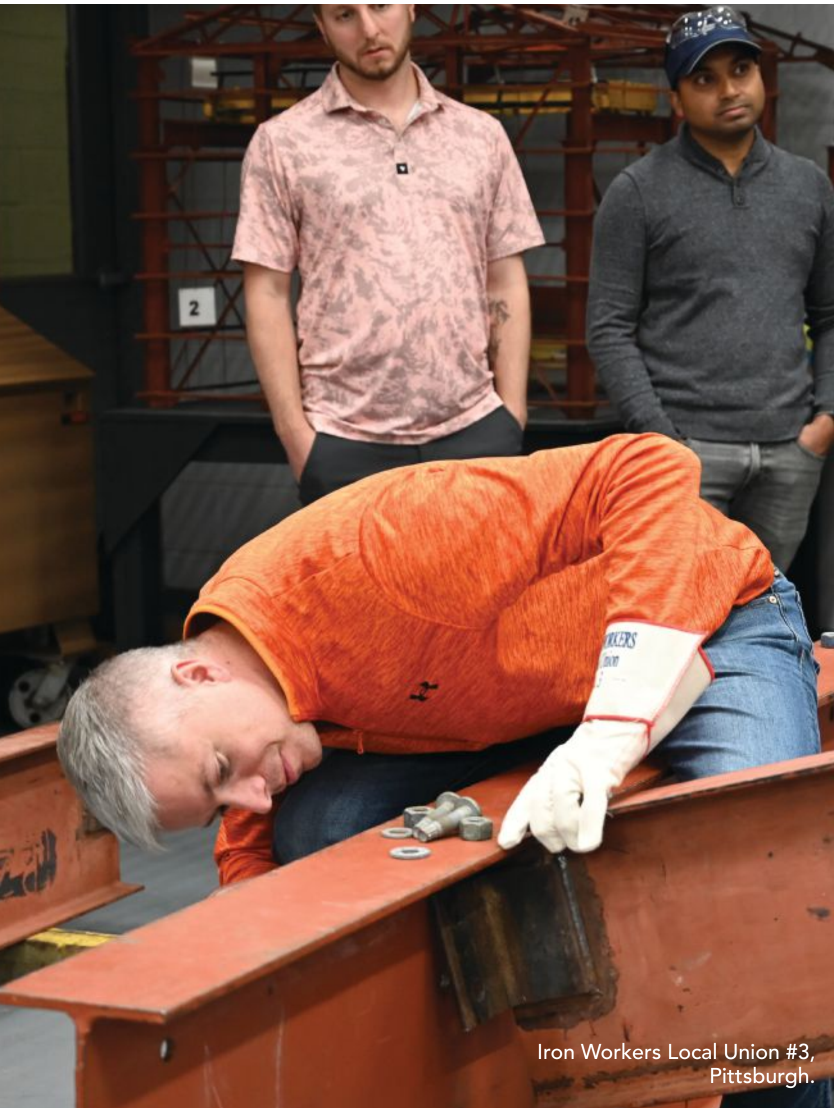
right: Students practiced welding with the virtual welder at Basden Steel.

below: Basden Steel visitors also learned how to drill and tighten bolts.

above: Members of the HOK design team that worked on CITYPARK in St. Louis accept their 2024 IDEAS^2 award.

left: SteelFab and SidePlate/MiTek hosted a crowd of mostly engineers for a jobsite tour of a hospital tower in Charlotte.

Hillsdale Fabricators took about 30 architects, engineers, and fabricators through its St. Louis shop—among them members of the HOK design team who received their 2024 IDEAS^2 Award for its work CITYPARK, a Major League Soccer stadium in St. Louis. SteelFab, Inc., in combination with SidePlate/MiTek, hosted members of the Structural Engineers Association of North Carolina for a presentation at its Charlotte headquarters and a jobsite tour of a recent project, a 12-story bed tower currently under construction on the Atrium Health Carolinas Medical Center campus. The building is framed with 10,500 tons of structural steel and includes nearly 900 SidePlate joints.



Iron Workers Local Union #3, Pittsburgh.

Iron Workers Local Union #3, Pittsburgh.

Iron Workers Local Union #482, Austin.

Iron Workers Local Union #5, Largo, Md.

Iron Workers Local Union #40 and #361, Astoria, N.Y.

Terrific Training Centers

Iron Workers Local training centers are annual SteelDays participants, and locations in Austin, Pittsburgh, Astoria, N.Y., Wixom, Mich., Benicia, Calif., Largo, Md., and St. Paul, Minn., invited students and professionals to step into an ironworker's boots for a day. Attendees at each site learned how to weld, guide steel members into place during a crane pick, tie members and rebar, and cut steel. They could also attempt to scale a 30-ft column, and most who tried it learned that successfully climbing it takes years of practice.

"We don't get to see this in the office," said Corey Miller, an engineer at Tunstall Engineering Group who visited the Iron Workers Local Union #3 training center in Pittsburgh. "It's great to see what they actually do in the field."

Some training centers only hosted student groups, while others opened their doors to engineering professionals and students.

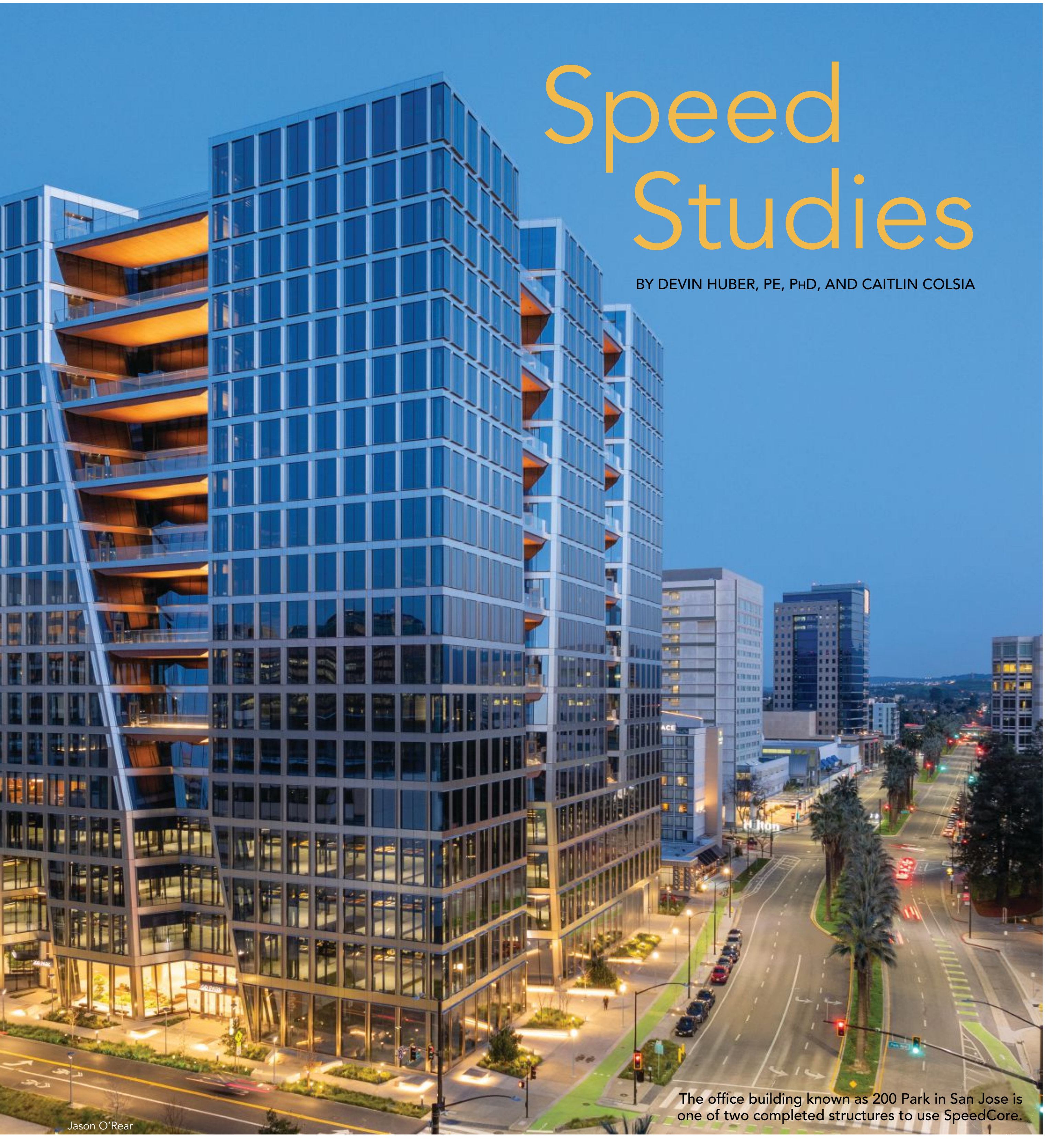
If you could not attend a 2024 SteelDays event, there's no need to wait until 2025. If you're interested in a fabrication shop tour, contact a local AISC member (there are nearly 1,000, and you can find them all at **aisc.org/aisc-membership**). Want to visit an Iron Worker training facility? Contact IMPACT (**www.impact-net.org**). They'll happily demonstrate their role in the American structural steel supply chain. ■

Patrick Engel (**engel@aisc.org**) is the associate editor of *Modern Steel Construction*.

Research projects were a crucial part of AISC's Need for Speed initiative—and several of them made significant impacts on faster steel construction.

Speed Studies

BY DEVIN HUBER, PE, PhD, AND CAITLIN COLSIA



Jason O'Rear

The office building known as 200 Park in San Jose is one of two completed structures to use SpeedCore.

Erecting SpeedCore sections at 200 Park.

MKA

AISC AIMED HIGH with its Need for Speed initiative that launched in 2019. Need for Speed's goal was to increase the speed of designing, fabricating, and erecting steel buildings and bridges by 50% by the end of 2025. Fittingly, that goal reached completion faster than anticipated because of advancements, breakthroughs, and adaptation of methods and technologies that combine to slash time off structural steel projects.

One crucial piece of reaching that goal has been research projects. The "Increasing Speed Through Research" article in the December 2022 issue (read at **modernsteel.com/archives**) highlighted several AISC-supported programs that aim speed up steel design, fabrication, and construction. Those efforts have made significant progress since then.

Here's a snapshot of recent advances in some of AISC's Need for Speed projects. For a visual accompaniment, the February and March issues will feature infographics that illustrate research updates and crucial time-saving technologies.

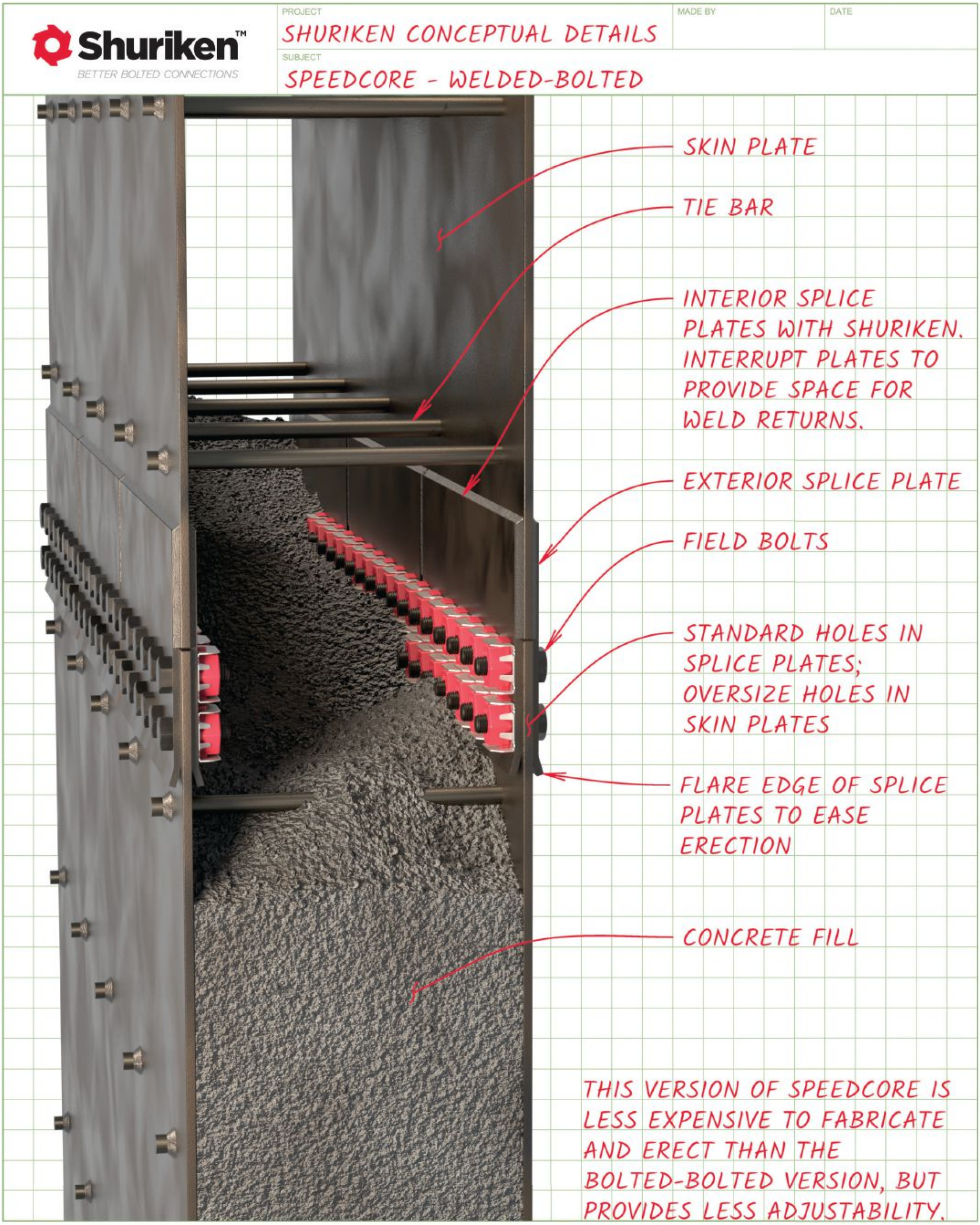
SpeedCore 2.0

Composite plate shear walls/concrete filled (C-PSW/CF), also known as SpeedCore, is a non-proprietary, revolutionary composite shear wall system gaining popularity throughout the United States and across the world. The system lives up to its name—it saved ten months of construction time on Seattle's Rainier Square and three months on 200 Park Ave. in San Jose, Calif. That time reduction equated to approximately 43% time savings on both projects compared to a traditional reinforced concrete wall system.

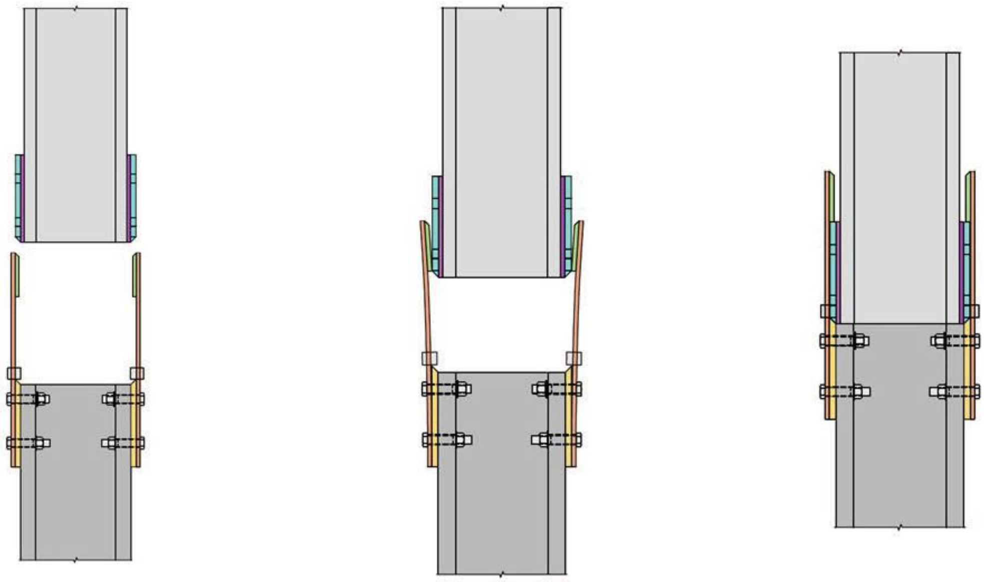
The December 2022 article highlighted ongoing research and development related to SpeedCore, including optimizing connection details at key locations such as splices and foundation connections, potentially further reduced fire protection requirements, and a forthcoming Design Guide. From this work, and ongoing collaborations with various industry partners, we now know:

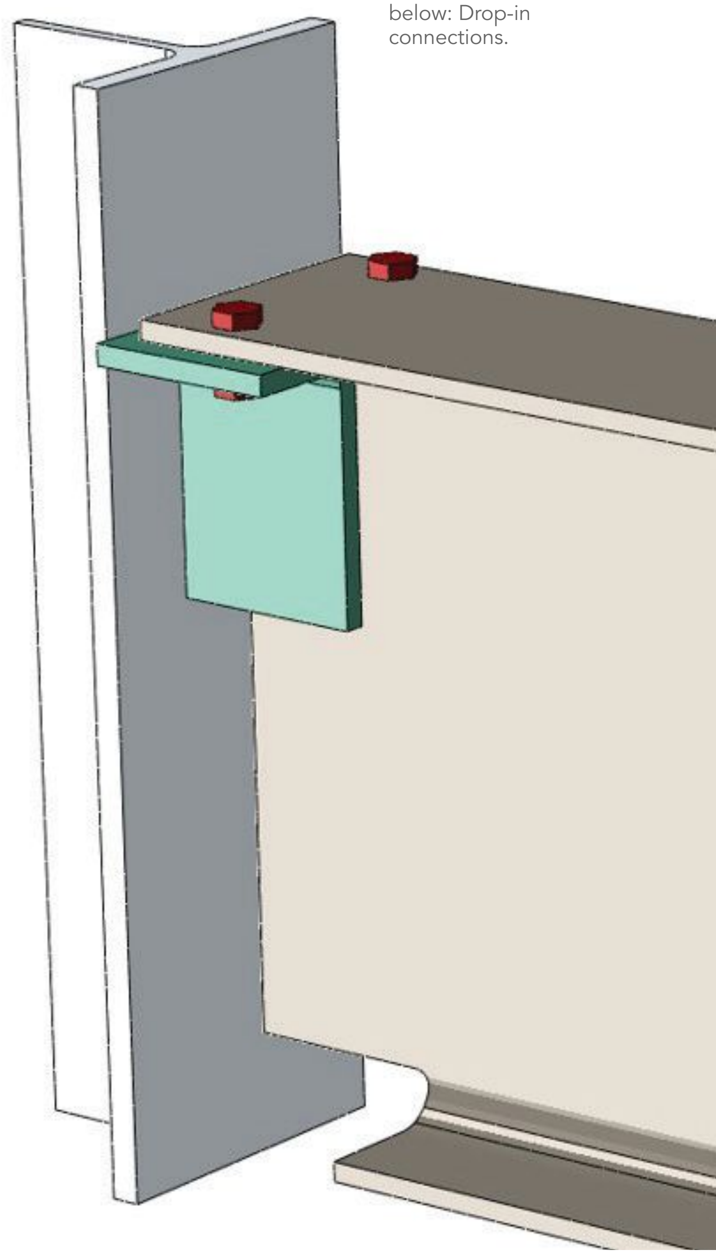
- Bolted splice connections can be used for connecting the face plates at their joints, which is particularly attractive for buildings in areas of low to moderate seismic demand.
- Wall-to-foundation connections can be greatly simplified.
- Spray-applied fireproofing can be greatly reduced, often only needed in the areas where floor beams connect to the SpeedCore face plate.

AISC Design Guide 38: *SpeedCore Systems for Steel Construction* is available for designers to learn about the system, and several AISC *Engineering Journal* papers are available reporting the results of the most current research. AISC members can download Design Guide 38 for free at **aisc.org/dg**.



A bolted splice option for SpeedCore implementing Shuriken nut keepers.





above: SnapLocX.
below: Drop-in connections.

SpeedConnection

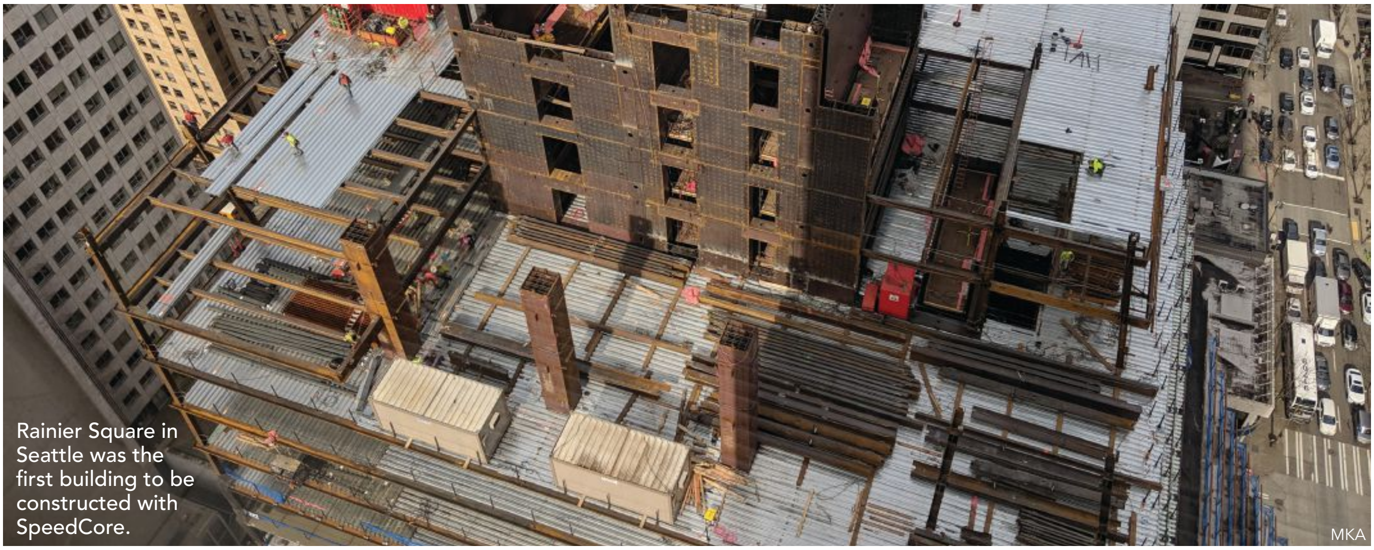
An area with many possibilities for increasing the speed of steel construction is located at the connections between members. In 2022, AISC hosted a competition for ideas to increase the speed of connections. Three of the many submissions were selected for study:

The SnapLocX: This novel connection increases the erection speed of column splices in gravity columns. The first phase of research is complete, and the research has proven the concept of this connection. The second phase will include experimental testing of the concept and refinement of the details for construction. By minimizing field bolting and welding, this connection shows great promise in increasing the speed of construction. (Jeff Berman, PhD, and Dawn Lehman, PhD, at the University of Washington are leading the project).

Drop-In Connections: Like SnapLocX, the drop-in connection also aims to increase the construction speed by minimizing field bolting and welding. Drop-in shear connections are an erector-friendly alternative to conventional connections such as shear tabs or double angles. Drop-in connections can increase erection speed and safety due to their inherent stability prior to bolting. In addition, only two bolts are required per connection. The structural performance of drop-in connections exceeds expectations with significant shear strength, along with adequate ductility and torsional stiffness.

The drop-in connection research has completed the extensive experimental program, including testing 12 full-scale connections. In addition, the finite element parametric study was recently completed, covering a wide array of geometries. Currently, the research team is working on refining the design methodology and preparing design aids. (Matt Yarnold, PhD, and Kadir Sener, PhD, Auburn University).

SpeedBox Connection for SpeedCore coupling beams: As SpeedCore research advanced, it created the opportunity to increase speed even more by making the wall-to-coupling beam connections easier to fabricate and erect. The SpeedBox connection aims to do just that. This proposed connection is based on four guiding principles: eliminating field welding, utilizing industry-standard construction techniques and materials, built-in features for placing or "seating" the beam during erection, and minimizing field pre-tensioning operations for installation of high-strength fasteners. (Amit Varma, PhD, Purdue University).



Rainier Square in Seattle was the first building to be constructed with SpeedCore.

MKA

FastFloor Commercial

The FastFloor Commercial concept has the potential to increase the speed of floor framing by 50%, according to studies from two general contractors. The idea is elegantly simple: a panelized module consists of wide-flange beams and a steel plate sub-floor. The team developing FastFloor Commercial includes top researchers from several universities, prominent structural design engineers, fabricators, contractors, and several AISC staff members.

Since December 2022, the research team has narrowed the designs to a few standard modules to continue increasing the speed of fabrication, delivery, and erection. Vibration and acoustic testing of a sample module has been conducted, and the results show tremendous promise. Experimental testing of a full-size bay is currently underway, and the tests will provide further information into the strength and serviceability of the system.

FastFloor Residential

The FastFloor Residential concept is a novel floor framing system suitable for low- and mid-rise residential and commercial applications. It, too, is simple: a panelized floor consisting of either metal deck sandwiched together to create a cellular shape or deep metal deck covered with non-combustible structural panels. The deck is supported by wide-flange beams, either with a reduced depth seat or on the bottom flange of the beam.

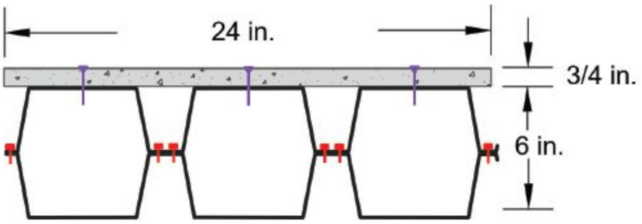


Figure 1. FastFloor Residential cross-section

FastFloor residential undergoing tests.

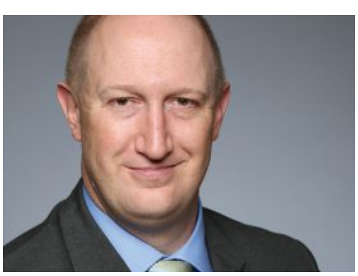
Asymmetric Beams

Yarnold's research into using mill-rolled asymmetric shapes to support floor framing brings new ideas to increase speed in construction. The new beams show strong promise in increasing the speed of construction and decreasing the floor-to-floor depth of steel-framed buildings.

The asymmetric shape allows for the floor deck to be set on the bottom flange of the beam, meaning the beam is within the depth of the floor slab. The system could use a wide range of floor slab systems, including concrete over metal deck or cross-laminated timber. The project is near completion, and the research team is finalizing tables of the cross-sectional shapes and construction details. AISC Engineering and Research staff is furthering studies by developing rules of thumb for optimal bay sizing and beam spacing within the bays.

Up Next

These innovative projects have advanced the steel construction industry and contributed to reaching the goal of increasing the speed of steel construction by the end of 2025. But this year does not represent a conclusion to speed-focused research. AISC will launch several new innovative, game-changing projects soon that will continue to advance the steel construction industry. ■



Devin Huber (**huber@aisc.org**) is director of research, and **Caitlin Colsia** (**colsia@aisc.org**) is a staff engineer, both with AISC.

Embodied Carbon by the Numbers

BY JOHN CROSS, PE

Determining embodied carbon of construction materials involves few finite values and ample critical thinking.

REDUCING EMBODIED CARBON has become a focal point among proponents of sustainable construction. The global production and installation of construction products accounts for 11% of global greenhouse gases measured on an equivalency basis, so reducing the impacts of global warming requires those products' decarbonization.

Embodied carbon is not the amount of carbon present in a construction material. It's the amount of greenhouse gases emitted during the manufacturing process. These emissions include the impacts of the manufacturing process and the impacts associated with the materials and energy used in manufacturing.

Greenhouse gases include carbon dioxide, methane, and other chemical compounds. They're measured by their carbon dioxide equivalent (CO_2e) based on their level of infrared light absorption and rate of decay in the atmosphere. For example, methane (CH_4) captures nearly 30 times the amount of infrared light than carbon dioxide (CO_2), but it decays roughly 10 times faster. If CO_2e is measured based on a 100-year time horizon, 1 ton of methane equals 28 tons of carbon dioxide.

The embodied carbon of a construction product is reported in an environmental product declaration (EPD) as a 100-year time horizon global warming potential (GWP-100) in kilograms of CO_2e for one declared unit of the product. The declared unit is a metric ton for steel products and a cubic meter for concrete and wood.

The GWP-100 of various construction materials cannot and must not be compared. GWP-100 is based on different declared units, and different amounts of material are required to accomplish the same purpose for different products. The tonnage of hot-rolled sections, hollow structural sections (HSS), or cold-formed metal framing will be different even when they satisfy the same structural requirement. And a cubic yard of concrete is significantly different than a cubic yard of dimensional lumber. The functional performance of each is different. They can only be compared on a functional basis within the context of a fully designed structure.

GWP-100 is not a precise value for a particular product being produced by a particular company. Rather, GWP-100 is an estimate based on different scopes, modules, and uncertain assumptions.

PRODUCT STAGE			CONSTRUCT-ION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D

Fig. 1.

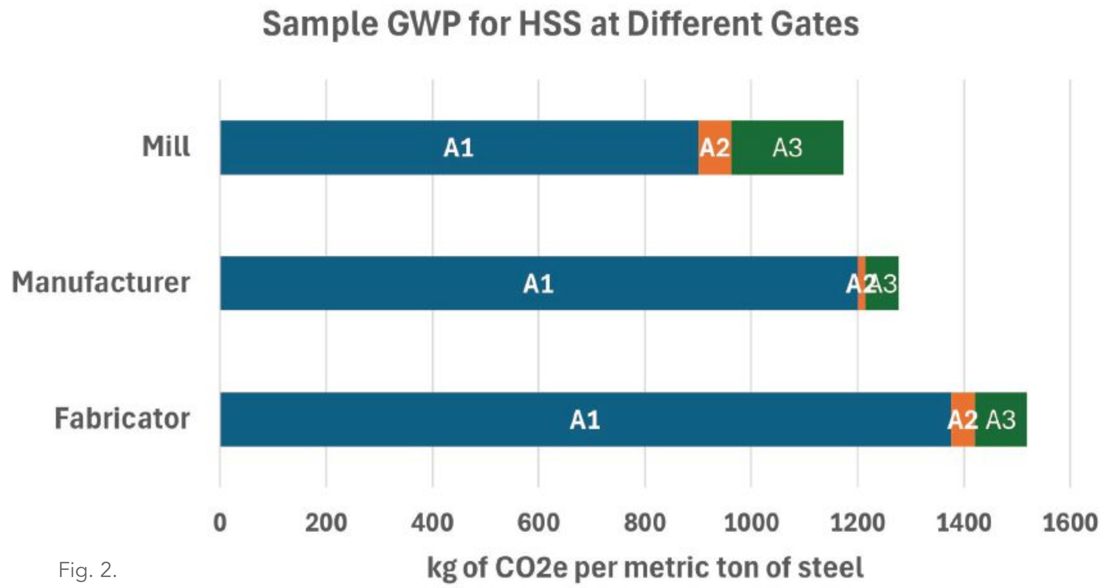


Fig. 2.

Modules that Shift

EPDs contain environmental impact results for various stages and modules (shown in Figure 1) for several impact categories, including GWP-100.

A typical construction product EPD will include only modules A1 to A3 (Figure 1), the product stage, which attempts to capture the embodied impacts associated with material and energy inputs (A1), the transport of raw material to a manufacturing facility (A2) and the manufacturing processes (A3). These EPDs have a cradle-to-gate scope.

But the gate is not always the same. For steel, it could be the mill gate, the manufacturer's gate (for a product like HSS), or the fabricator's gate. The gate changes the values in A1, A2, and A3. For a mill product A1, A2, and A3 are straightforward: A1 is the material inputs, A2 is the transportation of that feedstock to the mill, and A3 is the production process.

The calculation becomes more complex for steel products manufactured from mill products. Using HSS as an example, A1 is the hot-rolled coil used in the manufacturing process; A2 is the transportation of the coil to the manufacturing facility, and A3 is the HSS manufacturing process. It's even more complex when including fabrication: A1 captures the impacts of the HSS product, A2 the transport of the HSS to the fabricator, and A3 the fabrication activities. Throughout this entire sequence, losses associated with material overages are considered.

The total of modules A1, A2, and A3 is considered when developing compliance thresholds in Buy Clean programs, but should never be used for comparisons between materials and products (see Figure 2).

Modules A4 and A5 report impacts associated with transporting a product to the jobsite (A4) and activities in that material's construction process, such as steel erection (A5). These impacts are dependent on the product and assumptions being made.

For example, for a fabricated hot-rolled section, A2 would be the transportation impacts from the mill to the fabricator and A4 from the fabricator to the jobsite. But for steel deck, A2 would be the coil transport to the deck manufacturer and A4 would be from the deck manufacturer to the jobsite. While A2 and A4 amount to the distance from the mill to the jobsite, the allocation of distances between them can significantly impact the combined A1, A2, and A3 total decision-makers use in selecting and tracking project material.

The use stage "B" modules are often ignored when construction materials are being considered. That's an oversight, because modules B2 to B5 address product maintenance, repair, replacement, and refurbishment during the structure's anticipated service life. All significantly impact the product's embodied carbon.

A product with minimal or no required maintenance, repair, or replacement over the anticipated service life of the structure will report these modules as zero. When those are required at intervals shorter than the anticipated service life, the impacts associated with the material, energy, and activities must be included. The use stage introduces time considerations into evaluating global warming impacts that shouldn't be ignored.

At some point, the structure will be demolished or, preferably, deconstructed, and the "C" modules capture the associated global warming impacts. These values are low for steel structures, because only 2% of structural steel is landfilled at end of life.

Module D is outside the system boundary of a construction product and used to estimate possible future benefits. For steel products, it would be a credit for products that have a higher recycling rate than recycled content—typically products from mills using iron ore, coke, and limestone. A credit would be applied to a product produced at an electric arc furnace mill, and the basis for it is the potential recycling of those products would offset the necessity of future primary production.

The speculative nature of Module D in predicting future recovery and recycling rates may be appropriate for short-life products such as cans, which are typically recycled within months, but not for long-life products such as structural steel.

Fluctuation is Constant

Every value reported in any module has uncertainties associated with the quality and consistency of background data sources. Different databases may report different impact values for materials introduced into the steelmaking process. These impact values will change as their producers reduce their own greenhouse gas impacts. An EPD published in 2022 based on primary data from 2019 will show different results than an EPD for the same product published in 2024 using the same primary data from 2019.

The variance is clearly seen in the background data being used to account for the electricity used in the steelmaking process, which accounts for approximately 40% of structural steel's embodied carbon. The electricity a mill uses may come from several sources: the regional electric grid, onsite renewable electricity generation, or purchased renewable electricity generated offsite and delivered through the regional grid. As the electricity mix becomes more renewable, the embodied carbon associated with a mill's products will decrease. A steady increase in renewable energy use means an EPD published for a mill product using data for the prior year is already out-of-date and overstates the product's GWP-100.

GWP-100 impacts are reported based on a declared unit of one metric ton, but not all impacts are directly related to a metric ton of steel. Fabrication is the best example. Different projects and different project specifications control the amount of fabrication required—not the project's tonnage. No two projects are the same, and each will result in different global warming impacts on a per-ton basis. The fabricator does not control the project's design, and the design directly impacts the GWP-100.

Fabrication impacts are typically reported based on the industry average of multiple fabricators working on a large variety of projects. The industry average estimates a project's GWP-100 but does not provide an exact value for the impacts associated with a specific fabricator on a specific project. Such a determination is impossible.

Selecting a fabricator based on sustainable performance should be based on evaluating the fabricator's steps to lower their embodied carbon footprint, such as minimizing waste rates and using renewable energy, particularly electricity—not a fabricator-specific EPD where the impacts are based on projects fabricated during the data collection period. The AISC Fabricator Sustainability Partner program (**aisc.org/partnerprogram**) documents steps taken by participating fabricators to lower GWP-100.

Be Careful Comparing

GWP-100 impacts reported in EPDs are not finite values. They are calculated estimates that will get better and more accurate, but they will always be based on a snapshot in time with uncertainties surrounding them. While there is value in comparing GWP-100 between identical products from different producers, interpreting that comparison should always be based on understanding the uncertainties surrounding the data. A difference of 25% would be significant, a difference of 5% would probably not.

One ton of steel product cannot be compared to one ton of concrete product or one ton of wood product on a declared unit basis. The results would be meaningless. But even when the comparison is being conducted on a functional unit basis within the context of a whole building life cycle assessment (WBLCA), a comparison is questionable at best. Not only do the same uncertainties of background data, quality of data collection and timing impact the comparison, but assignment of activities to certain modules and calculation methodology do as well.

Ready-mix concrete and dimensional lumber are not fabricated offsite. Structural steel is. Fabrication impacts for steel are assigned to A3. But for ready-mix concrete and dimensional lumber, jobsite activity—including forming, placement, and carpentry—are assigned to A5.

In current WBLCA programs, the A5 values are typically based on estimates, not actual field data or the type of structure being constructed. This misalignment will underestimate the product stage for ready-mix concrete and dimensional lumber compared to steel, resulting in inaccurate product stage comparisons.

Even more significant are the methodological differences between materials—especially evident in the treatment of wood feedstock used in producing wood products. The steel industry is committed to capturing all the GWP-100 impacts associated with the feedstocks (A1) used in making steel products. Wood product producers claim on a national basis that their wood feedstock has minimal net GWP-100 impacts. The claim is based on a plus/minus methodology that allows biogenic carbon emissions to be offset when the wood originates from sustainably managed forests. But not all forests are sustainably managed and harvested. The U.S. Forest Service estimated in 2020 less than 15% of the country's forest acreage is certified as sustainably managed and harvested.

Instead of accounting for the embodied carbon differences between sustainably and non-sustainably produced wood, the wood industry follows a footnote in the relevant ISO standard that allows short-circuiting the certification process by determining if a nation's forest acreage is stable or increasing. In a 2020 EPD, the American Wood Council claimed that because U.S. forest acreage has remained stable or slightly increased, all forest products harvested in the U.S. are sustainable by definition. Applying that principle to specific U.S. wood products is a loose and undisciplined interpretation. While that approach may be deemed legitimate under the ISO standard, it is far from transparent regarding the actual embodied carbon impact of the forest products from which construction products are produced.

The lack of transparency is further compounded by the wood industry recently releasing three new regional EPDs headlined "Radical Transparency." All use the plus/minus approach, even though the U.S. Forest Service has identified one of the regions (the Pacific Coast) as having decreasing forest stocks.

The wood industry's lack of true transparency reflected in its calculation methodology makes comparing different materials problematic, even on a functional basis within a WBLCA.

Minimizing embodied carbon in construction materials and projects that use them is critical. But those materials should be evaluated based on a full understanding of the available data, not blindly compared without a full knowledge of the numbers' basis and how they were calculated. GWP-100 values for construction materials will never be perfect. The structural steel industry is committed to improving them through transparency, timeliness, quality background data sources, and methodological consistency. We challenge other construction product industries to make the same commitment. ■

*This article is a preview of the 2025 NASCC: The Steel Conference session "Embodied Carbon of Construction Materials: What's In the Numbers." To learn more about this session and others, and to register for the conference, visit **aisc.org/nascc**. The conference takes place April 2–4, 2025 in Louisville, Kentucky.*

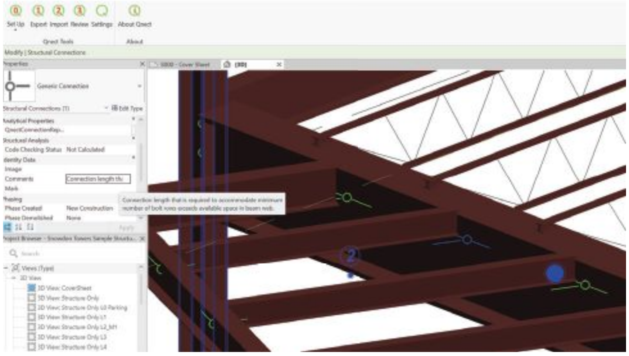
John Cross (cross@aisc.org) is a former vice president at AISC, a consultant to AISC, and the owner of Crosswind Consulting LLC.

This month's New Products include an RFI-preventing software, an interactive 3D model software, and an update to an online girder clamp configurator.

Spatial Construx Nception

Spatial Construx's Nception provides a fast, easy-to-use solution to take your projects from Autodesk Revit to an interactive, first-person 3D model that includes all the project data. Working with the light and materials settings in Autodesk Revit, Nception lets you visualize and explore your designs in first person, interactive 3D. It's perfect for testing various design scenarios before committing them to plan.

Nception works on projects of all sizes and disciplines. In Nception, you can access all the information about an object by selecting it while you walk through your model. Nception helps you quickly move from Revit to real time with no additional effort. Understand your projects like never before and get things right from the start with Nception. Visit **www.spatialconstrux.com/products** to learn more.



Qnect for Autodesk Revit

Qnect for Autodesk Revit is a cloud-based, cutting-edge solution that discovers steel issues early in design so engineers can resolve them before they become RFIs. The tool detects issues in modeling accuracy, constructability, and engineering of the structural frame caused by connection design and detailing. It also identifies joints requiring special reinforcement such as doublers and stiffeners to document complex engineering details more quickly.

The impact of resolving potential RFIs early is greater profitability for the engineer during the construction administration phase. It also results in better operational efficiency, design quality, and time savings to refocus on higher-value engineering tasks.

Qnect worked closely with leading structural engineering firms over an 18-month span to validate and optimize the technology. With both these new BIM capabilities, structural engineers in the future will be equipped to create more constructable designs and more efficiently engineer and compare steel connections and framing to minimize embodied carbon. Visit **www.qnect.com** for more information.

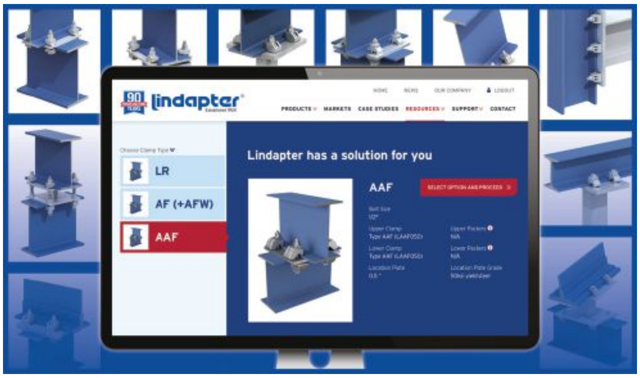
Lindapter Girder Clamp Configurator

Lindapter's online Girder Clamp Configurator is your key to instant steel connection detail drawings, and an upgraded version is now available. With enhanced features and user-friendly improvements, Lindapter made it easier than ever to design and select the right Lindapter Girder Clamp for your requirements.

Upgraded Girder Clamp Configurator features:

- Clearer explanations: Understand the combined loading method for better decision-making.
- Streamlined project organization: Stay organized by capturing project names within the configurator.
- Accurate calculations: Capture quantity, beam sections, and applied loads for precise calculations.
- Expanded connection options: More flexibility with Type A and Type AF options for the End Plate connection arrangement.
- Australian beams and columns sections: Standard Australian UB and UC sections included for tailored solutions.

Visit **www.lindapter.com** to learn more.



FORGE PRIZE

AISC Selects 2025 Forge Prize Jurors


Emily Baker


Matthew Marani


Parke MacDowell

AISC has selected the three jurors for the 2025 Forge Prize, and one is the award's most recent recipient.

Emily Baker—an inventor, fabricator, architect, and associate professor of architecture at the University of Arkansas—is one of the three 2025 Forge Prize jurors less than a year after she earned the award herself. *Architectural Record* special sections editor Matthew Marani and Payette associate principal and director of fabrication Parke MacDowell are the jury's other two members. They will decide who earns the 2025 Forge Prize and the $15,000 first prize that comes with it.

Baker won the 2024 Forge Prize with a landmark trailhead rest area that showcases her Spin-Valence system, a revolutionary steel space frame with beauty and functionality. Spin-Valence allows a single sheet thickness of steel material to vastly increase its depth, producing a structural space frame using a kirigami cutting and folding strategy.

"Spin-Valence is a perfect example of what the Forge Prize is all about," AISC senior architect Jeanne Homer said. "It capitalizes on the unique characteristics of structural steel to create something entirely new. It's strong while being light, airy, and sculptural, but has entirely practical applications like its ability to be shipped flat and spun up onsite, which could make it a unique solution to problems in space."

Baker's concept has gone even further. A sculptural Spin-Valence piece is in the permanent collection of Cranbrook Art Museum. Curvahedra, her collaboration with mathematician Edmund Harriss, is permanently installed on the University of Arkansas campus.

Baker has focused on self-structuring material systems and experimentation in her creative practice, research, and teaching.

In addition to the AISC Early Career Faculty Award and Forge Prize, Baker has received an ACSA Design Build Award for the Audi-Fab design/build studio sequence, which also received an AIA Design Merit award. She's currently collaborating with researchers from MIT, University of Virginia, and Princeton University on novel structural and construction systems.

Baker holds degrees in architecture from the University of Arkansas and Cranbrook Academy of Art. She teaches studios, structures, and fabrication at the University of Arkansas, and she previously taught at the American University of Sharjah and Tulane University.

Marani was a program manager at *The Architect's Newspaper* before he joined *Architectural Record*. He also has several years of experience as a freelance writer specializing in urban planning, historic preservation, and architectural technology.

MacDowell established Payette's fabrication group, which elevates design process and communication across the breadth of the firm's work. His design-forward projects have recently garnered two AIA 2021 Regional and Urban Design Awards and a 2021 American Architecture Award, among other accolades. He is the 2021 BSA Earl R. Flansburgh Young Architects Award recipient and is an adjunct professor of practice at Virginia Tech. He received the 2022 AIA Young Architect Award for his contributions to the profession.

The Forge Prize, co-administered by AISC's new Architecture Center and AISC University Programs, challenges emerging architects, architecture educators, and architecture students to create design concepts that embrace innovations in steel as a primary structural material.

Three finalists will each win $5,000 (plus free registration and travel support to attend the Architecture in Steel conference) and work with a steel fabricator to refine their design before presenting it live to the judges and the world in a live YouTube stream on March 18, 2025. The winner will receive a $10,000 grand prize and a showcase at the 2025 Architecture in Steel Conference (part of NASCC: The Steel Conference, April 2–4, 2025, in Louisville, Ky.).

AWARDS

David Stoddard wins Steel Bridge Task Force's Wilson Memorial Award

The Steel Bridge Task Force has named David Stoddard, senior steel applications engineer of SSAB Americas, as the recipient of its 2024 Alexander D. Wilson Memorial Award. The annual award recognizes individuals who have made significant industry contributions to advance steel as the material of choice for steel bridge supply, production, design, fabrication, or construction. It was instituted in 2022 to honor Alexander D. Wilson, a major contributor to the research and development of new technologies for the bridge industry who served as Steel Bridge Task Force chair for more than two decades.

The award was presented to David Stoddard at a Steel Bridge Task Force meeting on September 25 in Charlotte. Dan Snyder, vice president of construction at the American Iron and Steel Institute (AISI), presented the award. The award honors Stoddard "in recognition of his exceptional leadership and contributions to elevating steel as the material of choice for bridges, including his dedicated service as chairman of the Short Span Steel Bridge Alliance, advancing press-brake-formed steel tub girders, implementing innovative and sustainable materials, and supporting steel bridge research by providing test specimens and metallurgical updates."

"Under David's leadership as chairman of the Short Span Steel Bridge Alliance (SSSBA) for nearly a decade, we've witnessed remarkable advancements in steel bridge technology, including the increased adoption of press-brake-formed steel tub girders, which has made steel an even more competitive option for bridge applications," Synder said. "David's expertise and dedication have had a lasting impact on the steel bridge industry, making him a highly deserving recipient of this award."

Stoddard has spent over 37 years in the steel industry, with the last 14 working at SSAB's Muscatine, Iowa, plate mill. His responsibilities include collaborating with customers in the development and utilization of steel plate products for the bridge, shipbuilding, offshore structure, pressure vessel, and energy storage industries.

Stoddard is an active participant in multiple industry associations, including the National Steel Bridge Alliance (NSBA) technical and executive committees, several AASHTO/NSBA Collaboration Task Groups, the AISI's Bridge Task Force, SSSBA (he has been SSSBA chair since 2016), the National Association of County Engineers, the ABS Materials and Welding Committee, and the API Offshore Structures Materials Resource Group. He holds bachelor's and master's degrees in metallurgical engineering degrees from Michigan Technological University.

People & Companies

Arkansas-based **Lexicon, Inc.** promoted **Jimmy Stokley** to vice president of production for the **Lexicon Fabrication Group**. Stokley will oversee the production in Lexicon's fabrication shops, working closely with plant managers to ensure the company's diverse fabrication needs are met efficiently and effectively.

Stokley joined Lexicon in 1995. He began his career as a fitter, welder, and millwright at Schueck Steel. He later worked at Prospect Steel, where he held supervisor roles in quality control and production. Most recently, he was the manager at the Prospect Steel fabrication shop in Blytheville, Ark.

TYLin hired **Kimberly Slaughter** as its North America Transportation Leader. Slaughter has more than 35 years of experience in the public and private transportation sectors and will spearhead strategic initiatives to drive growth within the TYLin transportation sector. A key focus will be strengthening the presence of TYLin's transportation services while leveraging the company's technical expertise, talent, and geographic reach to enhance client delivery, retain and attract top talent, and drive collaboration.

Acrow designed and supplied a modular steel bridge to maintain vehicular traffic and enable marine vessel access following the demolition of a bascule bridge at the LaSalle Causeway in Kingston, Ontario. The causeway's owner selected a modular bridge that can accommodate vehicles, pedestrians, and cyclists, and the Acrow structure's design and durability allow for periodic removal and reinstallation to open the navigation channel for marine traffic.

The single-span bridge is 160 ft long and has a 24-ft two-lane width and a 5-ft-wide cantilevered walkway. Components began arriving on site in mid-August, and the bridge opened to traffic October 3. The first removal and reinstallation sequence took place October 15 and provided a window for vessels to access the city's inner harbor.

AISC's certification programs set the quality standard for the structural steel industry and are the most recognized national quality certification program. Its goal is to confirm to owners, the design community, the construction industry, and public officials that certified participants—who adhere to program criteria—have the personnel, organization, experience, documented procedures, knowledge, equipment, and commitment to quality to perform fabrication, manufacturing, and/or erection. The following U.S.-based companies were newly certified or renewed certification from Oct. 1 to 31, 2024.

Newly Certified Companies (October 2024)

Ducci Electrical Contractors Inc., Farmington, Conn.
Pinnacle Steel Inc., Henderson, Colo.
Quality Welding and Fabrication, LLC, Elida, Ohio

Certification Renewals (October 2024)

Advanced Iron Works Inc., Redmond, Wash.
Advantage Steel & Construction, LLC, Saxonburg, Pa.
AFC Steel, Ennis, Texas
AIW, Inc., Hyattsville, Md.
Al's Welding & Steel Fabrication, Chehalis, Wash.
American Ironworks & Erectors, Inc., Spokane Valley, Wash.
Anderson Steel Supply, Inc., Great Falls, Mont.
Atlantic Bridge & Engineering, Inc. Candia, N.H.
Atlantic Bridge & Engineering, Inc. Rochester, N.H.
Atlantic Bridge & Engineering, Inc., Hampton, N.H.
Baltimore Steel Erectors, LLC, New Freedom, Pa.
Banker Steel Co., Lynchburg, Va.
Barton Malow, Southfield, Mich.
Bender CCP, Kent, Wash.
BES Construction LLC, Springfield, Mo.
Briese Iron Works, Inc., Rochester, Minn.
Brothers Steel Erectors & Welding LLC, Angier, N.C.
By Design Steel Services, Molalla, Ore.
Capco Steel Erection Company, Providence, R.I.
Cape Fear Iron Works, Inc., Castle Hayne, N.C.
Carolina Integrated Solutions, Inc., Gaffney, S.C.
Casco Bay Steel Structures, Inc., South Portland, Maine
Cheyenne Steel, Inc., Mobile, Ala.
Cives Steel Co. New England Division, Augusta, Maine
Clermont Steel Fabricators, LLC, Batavia, Ohio
Columbus Steel Erectors, Columbus, Ohio
Commercial Fabricators, Inc., Bridgeview, Ill.
Contech Engineered Solutions LLC, Greeley, Colo.
Contech Engineered Solutions, LLC, Alexandria, Minn.
D&T Steel Fabricators, Inc., Pelion, S.C.
Dakota Precision Fabricating, Inc., Forman, N.D.
Doing Steel, Inc., Springfield, Mo.
Ducci Electrical Contractors Inc, Farmington, Conn.
Ducworks, Inc., Logan, Utah
Dura Bond Pipe, LLC, Steelton, Pa.
Dynamic Metals, Inc., Naches, Wash.
Eastern Metal Works, Milford, Conn.
EEI Enterprise, LLC, Yankton, S.D.
Falcon Builders, Inc., Brooklyn, N.Y.
Four Star Erectors Inc., Livermore, Calif.
Gentry Steel, Inc., Chattanooga, Tenn.
Greenberry Fabrication, Corvallis, Ore.
Greenberry Fabrication, Vancouver, Wash.
Gremp Steel Company, Posen, Ill.
GSI Highway, Hutchins, Texas
Gunderson Iron Works, Portland, Ore.
GWI Steel, Ogden, Utah
H.A. Fabricators, Logan, Utah
Haskell Corporation, Bellingham, Wash.
Hurtt Fabricating Corp., Marceline, Mo.
Instafab Company, Vancouver, Wash.
Integrated Structures Corp., Bellport, N.Y.
IWS Acquisition Corp, Portland, Ore.
J&B Fabricators LLC, Auburn, Wash.
Jon Edwards Steel Company, Columbus, Ohio
Kern Steel Fabrication, Inc., Bakersfield, Calif.
LeMar Industries, Des Moines, Iowa
Lincoln Contracting & Equipment Co., Inc., Somerset, Pa.
Lincoln Contracting & Equipment Co., Inc., Stoystown, Pa.
M&T Erectors, Mantua, N.J.
Madlyn Metal Fab LLC, Washougal, Wash.
Magnum Contracting, Inc., Fargo, N.D.
Maico Industries Inc., Ellsworth, Kan.
Marcelli Steel, Brookfield, Conn.
McCombs Steel Company, Inc., Statesville, N.C.
Merrill Fab Inc., Merrill, Wisc.
Merrill Steel, Schofield, Wisc.
Mid-City Steel, Inc., La Crosse, Wisc.
Mid-States Steel Corp., Boone, Iowa
Millerbernd Manufacturing Company, Winsted, Minn.
Mohawk Metal, Vancouver, Wash.
MSI Structural Steel, LLC, Anaheim, Calif.
National Steel City, LLC, Plymouth, Mich.
New England Road, Inc., Clinton, Conn.
Nick's Welding and Fabricating, Inc. Hixton, Wisc.
NWA Steel Co. LLC, Springdale, Ark.
Ohio Steel Industries, Inc., Pataskala, Ohio
P.H. Drew Inc, Indianapolis
Parker Manufacturing LLC, Boggstown, Ind.
Penn Steel Fabricators, Inc., Bristol, Pa.
PennFab, Inc., Morrisville, Pa.
Pinnacle Steel Inc., Henderson, Colo.
PKM Steel Service, Inc., Salina, Kan.
Pleskac & Pleskac, Inc., Lincoln, Neb.
Precision Fabricating Group, Easton, Pa.
Process Systems Inc. Construction Company, Memphis
Puma Steel, Cheyenne, Wyo.
Raulli & Sons, Inc., Syracuse, N.Y.
RNGD Prefab, LLC, Metairie, La.
Roma Iron Workers Inc., Brooklyn, N.Y.
S&J Construction Company, Inc., Oak Forest, Ill.
SAC Incorporated, Clearfield, Utah
Sanpete Steel Corporation, Moroni, Utah
Southern New Jersey Steel Co., Inc., Vineland, N.J.
Standard Steel Fabricating Company, Seattle
Steel Services, Inc, Indianapolis
Steel Specialties, Inc., El Paso, Texas
SteelFab, Fayetteville, N.C.
Stony Brook Manufacturing Company, Inc., Calverton, N.Y.
Structural Steel Products Corporation, Clayton, N.C.
SYNERGi LLC, Elkridge, Md.
T&M Manufacturing, Inc., Tremonton, Utah
Tarr Metal Works, LLC, Washington Township, N.J.
Ted Mannstedt & Sons, Inc., La Crosse, Wisc.
The Lynch Company, Inc., Portland, Ore.
Thompson Metal Fab, Inc., Vancouver, Wash.
Tobi Engineering Inc., Ingleside, Ill.
Topping Out, Inc. dba Davis Erection, Gretna, Neb.
Transco Industries, Inc., Portland, Ore.
Trinity Fabricators, Inc., New Albin, Iowa
TrueNorth Steel, Rapid City, S.D.
Union Metal Industries Corporation, Canton, Ohio
Utah Pacific Bridge and Steel LLC, Lindon, Utah
V&S Capital Steel LLC, Trenton, N.J.
Valmont Industries, Farmington, N.H.
Valmont Industries, Inc., Tulsa, Okla.
Veritas Steel, LLC, Eau Claire, Wisc.
W International SC, LLC, Goose Creek, S.C.
W&W | AFCO Steel Port Frazier, Little Rock, Ark.
W&W | AFCO Steel, Little Rock Plant, Little Rock, Ark.
W&W | AFCO Steel, Van Buren, Ark.
Wanner Metal Worx, Inc., Delaware, Ohio
Welding Works, Madison, Conn.
Western States Steel Erection, Billings, Mont.
Willamette Technical Fabricators, Vancouver, Wash.

ENGINEERING JOURNAL

First Quarter 2025 *Engineering Journal* Now Available

The first quarter 2025 issue of AISC's *Engineering Journal* is now available at **aisc.org/ej**. Here are highlights of a few papers.

Load-Dependent Critical Temperatures for Standard Fire Resistance of W-Shape Floor Beam Assemblies: Experimental Validation and Simplified Analysis
Michael M. Drury and Spencer E. Quiel

Comprehensive results of ASTM E119 (2019) standard fire tests (performed by AISC/AISI in 2015) are used to validate load-dependent critical temperature relationships that conservatively predict the thermally induced loss of flexural resistance for W-shape floor beam assemblies. The 16 tested assemblies used the same W8×28 section (coated with the same thickness of passive spray-applied fire-resistive material), supported 2½ in. of lightweight concrete (reinforced with welded wire mesh) on a 2-in. corrugated metal deck, and 154¾-in. clear span in one-way bending.

Four specimen groups in the following configurations were tested with four specimens each: restrained ends with composite slab, unrestrained ends with composite slab, restrained ends with non-composite slab, and unrestrained ends with non-composite slab. The four specimens in each group were each tested with a constant applied flexural load but at a range of magnitudes, inducing maximum bending moment from 23% to 60% of the section's ambient nominal moment capacity.

The results of these tests clearly demonstrate a relationship between the loss of flexural resistance and the increase in steel beam temperature (particularly the bottom flange temperature) as a function of applied loading. The fire-induced temperature increases in the protected steel beams are then used to validate lumped mass thermal calculations per the *Specification for Structural Steel Buildings* (ANSI/AISC 360-2022) and Part 1-2 of Eurocodes 3 and 4, which are classified as simple analysis methods per *Specification* Section A-4.2.4d.

Generalized Elastic Lateral-Torsional Buckling of Steel Beams
Robert S. Glauz and Benjamin W. Schafer

A concise review is provided of the classical elastic lateral-torsional buckling moment for steel beams as utilized in the AISC *Specification*. Rather than make assumptions regarding the cross-section properties, the derivation is provided in its general form for an arbitrary steel beam—that is, one that may be asymmetric and may include any manner of varying geometry, thickness, or cross-section shape. The cross-section properties that underpin the calculation are fully detailed. The assumptions that are inherent in the classical derivations (no shear, no cross-section distortion, etc.) are also fully detailed.

The way the generalized lateral-torsional buckling formula may be simplified for particular sections (for example, a singly symmetric channel) with no loss of accuracy is explained. Adaptations and approximations used in the *Specification* for elastic lateral-torsional buckling moment of specific sections (such as mono-symmetric I-section or angles) are assessed against the actual elastic solution, and the accuracy and clarity of the assumptions made are evaluated. The generalized formula, consistent with current assumptions but applicable to all structural steel cross sections, is recommended for future reference in the main body of the *Specification*.

Strength Coefficients for Eccentrically Loaded Weld Groups
Bo Dowswell

When 16th Edition *Steel Construction Manual* Tables 8-4 through 8-11 are used to calculate the strength of eccentrically loaded weld groups with $F_{EXX} \neq 70$ ksi, the values are multiplied by an electrode strength coefficient, C_1. The C_1 values are dependent on the filler metal classification strength, but they are not proportional to the filler metal classification strength ratio when $F_{EXX} \geq 80$ ksi. To consider the potential effect of reduced ductility, the C_1 values include reduction factors of 0.85 and 0.90 for higher-strength welds.

To investigate the accuracy of the electrode strength coefficients, the ductility of high-strength welds was evaluated using the data from 93 experimental tests from three existing research projects with $F_{EXX} >$ 70 ksi. The data was used to plot the weld metal tensile strength versus the normalized rupture deformation of both longitudinal and transverse fillet welds.

AWARDS

Gary Prinz Wins 2024 Steel Bridge Task Force Lectureship

Gary Prinz, PE, PhD, professor and director of the Grady E. Harvell Civil Engineering Research and Education Center at the University of Arkansas, received the 2024 Robert J. Dexter Memorial Award Lecture from the Steel Bridge Task Force.

Prinz received the award for his work on ultra-low-cycle fatigue damage prediction, ductile fracture simulation in additively manufactured steels, seismic performance of ductile frame systems, and fatigue assessment methods for steel infrastructure. His work on the fatigue behavior of shear studs has been instrumental in updating bridge design standards, including key contributions to AASHTO standards that helped improve steel bridges' reliability and performance nationwide.

Prinz joined the Department of Civil Engineering at the University of Arkansas as an assistant professor in January 2014. He holds three degrees from Brigham Young University and completed his postdoctoral research at the Swiss Federal Institute of Technology (EPFL). In 2018, he was honored with the prestigious Faculty Early Career Development award from the U.S. National Science Foundation for developing ductile fracture prediction tools for additively manufactured steel alloys.

The Dexter Memorial Lecture was instituted in 2005 in memory of Robert J. Dexter, an associate professor of civil engineering at the University of Minnesota and an internationally recognized expert on steel fracture and fatigue problems in bridges. The program provides an opportunity for individuals early in their structural engineering careers to present a lecture on their steel bridge research activities to the Steel Bridge Task Force and participate in its semi-annual three-day meeting.

advertiser index

A Pleasant Surprise Reuse

A STEEL BRIDGE originally intended only for research in a lab remained strong enough through testing to become a viable real-world structure. In late October, it was officially set in place for an unforeseen second life.

The town of Kent, N.Y., set a 40-ft-long steel bridge as a pedestrian crossing over a small section of Lake Carmel on October 31, solidifying its reuse after serving its purpose as a custom-built research test structure at the University at Buffalo. The bridge has 6-ft girder spacing, is supported by W27×84 sections, and is outfitted with buckling-restrained braces (BRBs)—all as part of a project to test the seismic resilience BRBs could provide in a bridge.

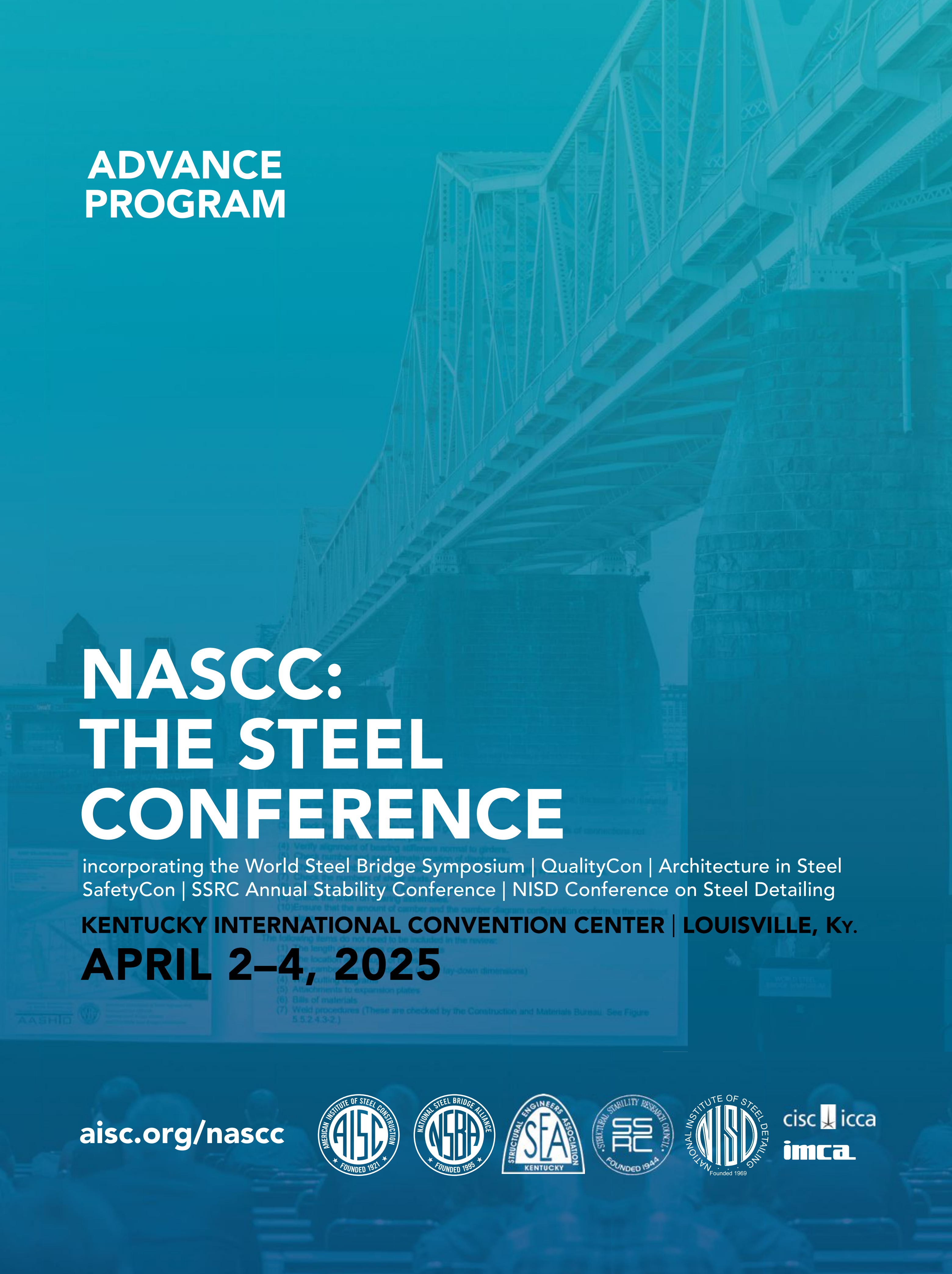
Buffalo engineering professor Michel Bruneau and former PhD student Homero Carrion Cabrera led the project and put the bridge through more than 100 simulated earthquakes that tested the BRBs' capacity. The research results alone made the project worthwhile. The bridge remaining undamaged after all tests made it even more impactful and highlighted steel's reusability.

The university donated the bridge to the Town of Kent, which needed a replacement crossing after storms washed out two culvert pipes in July 2023—the sixth time in 40 years that culverts were ruined. When Kent Highway Department Superintendent Richard Othmer learned about the bridge, he wrote to the university explaining why it would help and where he envisioned putting it. He received immediate backing from Kent Town Supervisor Jaime McGlasson and the Kent Town Board.

"We breathed a collective sigh of relief as we stood by the crane while the bridge was set," Othmer said. "The bridge was a perfect fit, with only 1 in. to spare on either side of the pillars. Bridge setting ended our three-year journey of solving a recurring infrastructure conundrum. We now have a durable and lasting structure that can withstand extreme weather events, enabling emergency access and egress to a repetitive and unremitting flood zone section."

The engineer (Barton & Loguidice) and contractor (Baker Brothers) made only minor structural changes before installing the bridge, which itself was also donation-based. AISC full-member fabricator High Steel Structures donated girder fabrication and shipment to the lab, CoreBrace provided the BRBs, full-member fabricator R.J. Watson fabricated bridge bearings, and AISC donated structural steel, bearing materials, and shear studs.

The bridge, now known as the Veteran's Park Memorial Bridge, will open to pedestrians in mid-November and be dedicated with a commemorative plaque on Memorial Day 2025. ■


ADVANCE PROGRAM
NASCC: THE STEEL CONFERENCE
incorporating the World Steel Bridge Symposium | QualityCon | Architecture in Steel
SafetyCon | SSRC Annual Stability Conference | NISD Conference on Steel Detailing
KENTUCKY INTERNATIONAL CONVENTION CENTER | LOUISVILLE, KY.
APRIL 2–4, 2025
aisc.org/nascc

NASCC: THE STEEL CONFERENCE

World Steel Bridge Symposium
QualityCon
Architecture in Steel
SafetyCon
SSRC Annual Stability Conference
NISD Conference on Steel Detailing

KENTUCKY INTERNATIONAL CONVENTION CENTER | LOUISVILLE, KY.

APRIL 2–4, 2025

EDUCATE, ENGAGE, AND EMPOWER

NASCC: The Steel Conference, the nation's leading conference for the design and construction of steel buildings and bridges, is heading to Louisville, Ky. on April 2–4, 2025.

The Steel Conference is the premier event for everyone involved in the design and construction of steel buildings and bridges. We feature more than 270 technical sessions (and 16 PDHs!); a giant exhibit hall showcasing over 300 products and services that can help you design and build better with steel; and the opportunity to network with your colleagues and make new connections, including leading designers, top fabricators, and prestigious researchers at the cutting edge of today's innovation.

This year's event also incorporates the World Steel Bridge Symposium, QualityCon, the NISD Detailing Conference, SafetyCon, Architecture in Steel, and SSRC's Annual Stability Conference.

One registration fee gets you into all of this, as well as keynote addresses, lunch in the exhibit hall Wednesday and Thursday, the welcome reception, and—of course—the fabulous conference dinner!

Mobile App

Put The Steel Conference in the palm of your hand! Stay organized with the session schedule tool; navigate the exhibit hall; learn about exhibitors; and network with attendees during the conference with our custom mobile app. Visit **aisc.org/nascc** to download the app in early 2025.

Make it social by networking with attendees and joining the conversation on X and Instagram by using **#NASCC25 #AISC**

What makes us different?

We carefully design our sessions to serve practicing professionals. Our goal is to provide information and skills that you can immediately put into use. While some of our sessions are developed through the traditional call-for-papers route, most are the result of our planning committee selecting relevant topics and then seeking out the top experts and engaging speakers to share their knowledge.

That's why our technical sessions consistently get rave reviews. Want to get a taste of what a conference session is like? Visit **aisc.org/learning** and watch one of the more than 2,000 posted sessions from previous conferences.

Who attends?

Our sessions are designed to cover all aspects of steel design and construction, from basic review sessions to advanced methodologies, and our audience is similarly diverse, ranging from professionals just a few months out of school to many of the top principals at the nation's leading structural engineering firms.

Last year's conference had nearly 7,000 participants, including structural engineers, architects, steel fabricators, detailers, erectors, academics, students, and product vendors/service providers—and we expect this year to be even bigger!

Registration and Housing

Registration and housing opens Wednesday, January 8, 2025. Pro tip: Register early! Registration fees increase each week. Visit **aisc.org/nascc/register** to register and to book your hotel reservation.

Registration includes:

World Steel Bridge Symposium

The World Steel Bridge Symposium (WSBS) brings together bridge design engineers, construction professionals, academics, transportation officials, fabricators, erectors, and constructors to discuss state-of-the-art practices that enhance steel bridge design, fabrication, and construction.

QualityCon

The best quality management processes don't fix problems—they prevent them. Improving your quality processes will boost your bottom line, and we've gathered experts to equip you with ideas and tools that will bring immediate value to your fabrication facility or erection jobsite, regardless of whether you hold AISC Certification.

SafetyCon

Safety first! AISC's Safety Committee has developed a special slate of sessions designed to give fabricators and erectors practical guidance and useful tools to promote safety.

Architecture in Steel

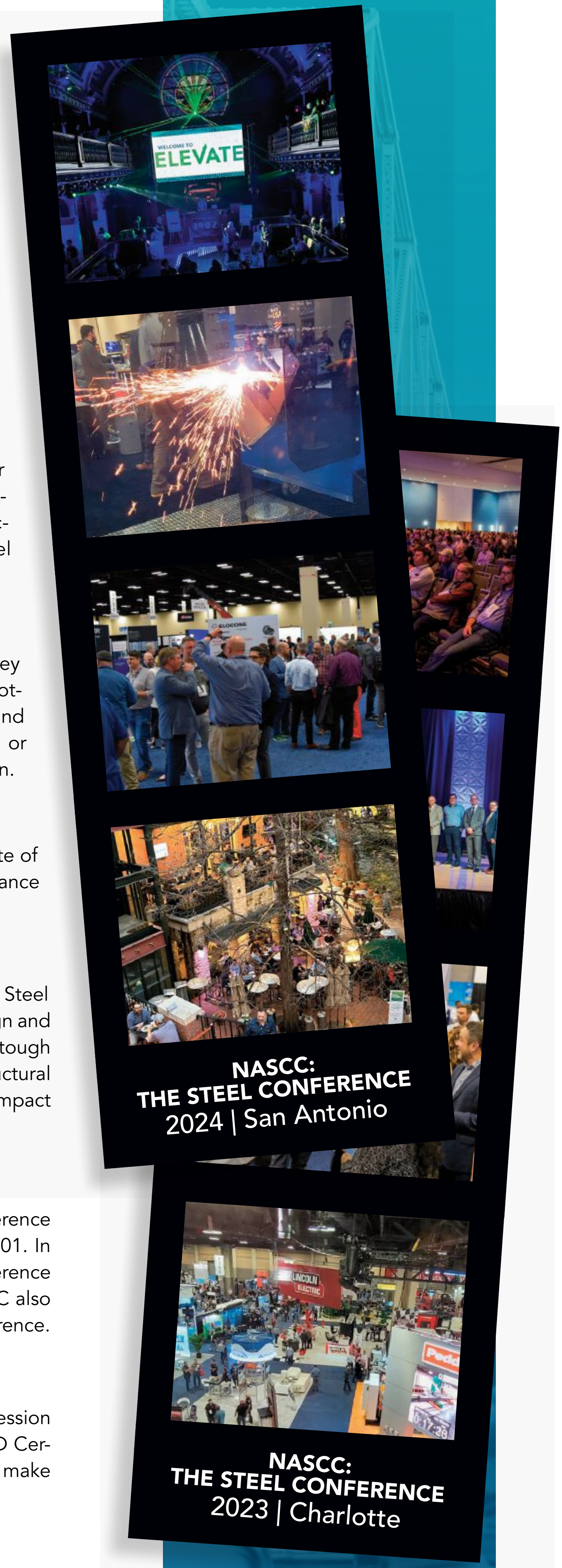
Architecture in Steel is the architectural community's home at the Steel Conference. Designers—and everyone else involved in steel design and construction—can expect to hear about ingenious solutions to tough design challenges, inspiring structures that came to life in structural steel, and the innovations that will define how structural steel's impact on a greener, safer, more beautiful future.

SSRC Annual Stability Conference

The Structural Stability Research Council's Annual Stability Conference has been held in conjunction with the Steel Conference since 2001. In addition to 13 sessions with more than 60 papers, the SSRC Conference includes the Beedle Award and MAJR Medal presentations. SSRC also holds its annual meeting immediately prior to the Stability Conference.

NISD Conference on Steel Detailing

The National Institute of Steel Detailing has developed a 13-session program specifically for detailers. The program parallels the NISD Certification program and provides practical information to help make you a better detailer!



NASCC: THE STEEL CONFERENCE

CONFERENCE KEYNOTES

Wednesday

How to Be Real When Working Virtually

William Arruda, a leading authority on the power of branding and using social media to succeed in your career, will offer practical advice on how to establish your personal brand—especially when you're meeting virtually.

Thursday

Recommendations for Improving the Quality of Structural Engineering and Construction Documents

Cliff Schwinger, one of the top-rated presenters at Steel Conferences for more than 20 years, will offer honest feedback for both designers and builders on how to improve the process of designing and building today's built environment.

Friday

Achieving Excellence in Fabricated Structural Steel

Ronnie Medlock, one of the best known bridge fabrication engineers, will present this year's T.R. Higgins Lecture and offer valuable lessons to both designers and fabricators.

NASCC: THE STEEL CONFERENCE
NETWORKING OPPORTUNITIES

Wednesday
Welcome Reception

Time: 5:30 – 7:00 p.m.
Location: Exhibit Hall

Kick off the conference with a networking extravaganza in the exhibit hall. Join us for a special preview of what exhibitors will offer and experience the latest trends in software, coatings, connection products, and more—plus refreshments, hors d'oeuvres, and excellent company!

ELEVATE

Time: 7:30 – 9:30 p.m.
Location: TBD

Everyone belongs in our industry—and at the Steel Conference! Join us at Elevate to celebrate the strength diversity brings to the steel industry and our built environment. This networking reception is a chance to come together to inspire change. Separate registration is required for this free event.

Thursday
Conference Dinner – An Evening on the Town

Time: 7:00 – 10:00 p.m.
Location: Fourth Street Live
Cost: Included with full registration.
Tickets are available for purchase for other registration types.

Louisville's Southern hospitality awaits—and there's a reason the editors of *Travel and Leisure* included Bourbon City in their list of the 50 best places to travel in 2024. Get to know The Steel Conference participants from the full spectrum of AEC fields during our block party at Fourth Street Live! Enjoy food and beverages from The Sport & Social Club, Tavern on Fourth, and PBR Louisville—plus a live band in the street—from 7:00 p.m. to 10:00 p.m. Thursday night.

NASCC: THE STEEL CONFERENCE
2025 SESSION LIST
(As of November 21, 2024)

Business
- Building a Culture That Builds PEOPLE
- Building Your Future Leaders
- Case Studies in Professional Ethics
- Engineering Your Story: A Guideplate to a Better You (and a Better Story)
- Ethics in Negotiation: Crafting a Path of Integrity in the Art of Negotiation
- Impact of AI in the Engineering Industry
- Maintaining Firm Continuity Despite Staff Turnover
- Meetings: The Good, the Bad and the Productive – Make Every Minute Count
- Navigating Conflict: Strategies for Proactive Resolution to Prevent Uncomfortable Challenges
- Steel Estimating 101 for Engineers and Architects
- Women in Construction: How to Mentor Them and How They Mentor Others

Career Accelerator Program for Steel
- An Understanding of AESS
- Construction Contracts 101: An Introduction to Important Contract Provisions and How They Impact Your Responsibilities
- Effective Communication
- Fundamentals of Bolting
- Fundamentals of Welding
- Introduction to Career Accelerator Program for Steel (CAPS)
- Modern Manufacturing of Structural Steel Shapes and its Impact on Design
- Personal Leadership and Career Development
- Quality and the Erector
- Quality for Fabricators
- Quality for Structural Engineers
- What AISC Can Do for You
- What Designers Need to Know About the *COSP*
- What Steel Erectors Need to Know About the *COSP*
- What Steel Fabricators need to know About the *COSP*
- What You Need to Know About the *COSP*
- Wrap up for the Career Accelerator Program for Steel (CAPS) for NASCC 2025

Case Studies
- A Look at the Complex Erection for the National Medal of Honor Museum
- A New Look for Kentucky Basketball
- Branching Out: The Design and Construction Innovations Behind Pittsburgh's New Terminal
- Building Better Bourbon
- Erection Engineering Case Study – The Robert Day Science Center at Claremont Makenna College, Claremont Calif.
- LAX MSC South – Structural Design for Building Transportation
- Recreating Louisville's Convention Center
- Seismic Retrofit and Corrosion Repair of the Transamerica Pyramid Spire

Cold-Formed Steel
- Designing with Thin Steel: Member Design per AISI S100 for AISC 360 Experts (Part 1)
- Designing with Thin Steel: Connection Design per AISI S100 for AISC 360 Experts (Part 2)
- Harnessing Cross-Section Stability with the Direct Strength Method
- Hot off the Presses: Recent Research in Cold-Formed Steel
- Innovations in Cold-Formed Steel Diaphragms
- Stability Nitty Gritty: Means and Methods

Connections
- A Jolt of Bolting: How to Use Them in HSS Connections
- Best Practices for Delegating Connection Design
- Connection Design – The Checks Not to Forget!
- Innovative Steel Castings for NASA's Mobile Launcher
- May the Uniform Force Method be With You
- Moment Connection – Design and Delegation Tips and Tricks
- One-Sided Bolting – No "Ifs", "Ands" or "Nuts"!
- Outside the Manual: Designing Atypical HSS Connections Beyond Standard Guidelines
- Practical Considerations for Shear Connections and the Single Angle Connection
- Shear Lugs: Misconceptions and Misunderstandings when Connecting Steel to Concrete
- When Shear Connections Aren't (Shear Connections)
- You Oughta Know

Design & Analysis/Engineering
- A Review of the New Global Stability Provisions of AISC 341-22
- Beam Over Column – Who is Bracing Who?
- Beyond the Blueprint: Unconventional Journeys in Design and Construction
- Building with HSS: Linking Manufacturing to Design
- Case Studies on Structural Stability Failures – You Make the Call
- Design of Coped Beams for Lateral-Torsional Buckling
- Design of Long-Span Trusses
- Don't Get the Shaft!
- Dream or Reality: Engineers, Fabricators, and Erectors Working Together
- Hot Topics in Buckling Restrained Brace Frame Design
- How to Keep Delegated Design a Friendly Collaboration
- Load Paths: "It Ain't Over Till It's Over"

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- Mastering Stability Design and Second-Order Analysis: Practical Tools and Insights
- Navigating the Software Maze: A Deep Dive
- Quality Considerations for the Use of Steel Castings in Building Construction
- Rules of Thumb for Designing Curved HSS
- Single-Angle Compression Member Design
- SpeedCore – The Need for Speed Part 1: Analysis and Strength
- SpeedCore – The Need for Speed Part 2: Connection and Erection
- Steel Stair Design in High Seismic Areas
- Successfully Specifying Hot-Dip Galvanizing
- The Follow Through – An Engineer's Guide to Thinking Down the Line
- Tips from Fabricators and Erectors to Designers on Ways to Reduce Cost and Increase Erection Speed
- Vibration Design of Recreational and Sports Facilities
- What Special Inspection Requirements Should Engineers Specify? Demystifying NDT
- Words of Wisdom from the Steel Industry
- WTF – What The Finish?!?!

Fabrication & Erection

- 10 Lessons from the Fabrication Trenches
- Advancing Tubular Steel Connections with Laser Cutting Technology (LCT)
- Building with SpeedCore – A Fabricator's (and Erector's) Perspective
- How to Get Paid on Time!
- Lessons Learned Along the Way – Project Management Edition
- Practical Guidance for Erection Engineering from a Steel Erection Engineer
- Rigging for Accuracy – Finding Adjustment
- Robots, Cobots, and Other "Bots"– How Automation Can Affect Your Bottom Line
- Subcontractor Preparedness and Readiness
- The "Art" of the RFI: How You Ask is Just as Important as What You Are Asking
- The Dynamic Duo: The AISC *Specification* Section A4 and the AISC *Code of Standard Practice*
- What Steel Fabricators Can Learn from Green Chili
- Who is Responsible for That? (or, What the AISC *Code of Standard Practice* Has to Say)
- Winning in Pre-Construction: Forty Ideas in 40 Minutes for Your Next Structural Steel Project

Innovations

- Advancements in SpeedCore Systems: Structural Performance under Fire Loading
- Advances in High-Rise Erection Engineering
- AISC Research: Innovations and Applications with Asymmetric Shapes
- Bolted Solutions for SpeedCore Systems
- FastFloor – Can It Revolutionize Floor Framing?
- Innovating Steel Construction: Additively Manufactured Connections in the AISC AM Bridge
- Innovative Applications of Large Steel Forgings – Moving Beyond Traditional Design Limitations
- Modularizing Steel
- Steel Innovations – Past, Present, and Future
- Take the Bull by the Horns with Drop-In Shear Connections

Joist/Deck

- Bad Vibes – Avoiding Vibration Problems in Steel Joist Concrete Floors
- Efficient Steel Joist Design – Floors
- Joists to the World
- Lateral Load Resisting Frames with Joist Girders
- Steel Joists Now and Forever: Evaluation and Reinforcement Methods
- Welding In, On, and Around Steel Joists
- What the Deck? Correctly Specifying Steel Deck

Legal

- A Fabricator's Guide to Subcontracting: Best Practices and Common Pitfalls
- Change Orders: How to Avoid Letting Them Make Their Problems Your Problems
- Delay Claims – Do I Need a Scheduling Consultant?
- Delegated Design: Is it the Right Option for Your Project?
- How to Be an Effective Engineering Expert Witness
- The Inefficiency Claim: How to Get Paid When Schedule Impacts Cause Extra Manhours

Manuals, Standards, and Design Guides

- AISC 358 – The How and Why of Prequalified Connections
- An Inside Look at the Updated Design Guide 16 – *Assessment and Repair of Structural Steel in Existing Buildings*
- ASCE 37-24 Updates
- Demystifying Composite Plate Shear Wall Design
- Navigating Composite Column Design With the New AISC Design Guide 6
- The Updated AISC N690-24 *Specification for Safety-Related Steel Structures for Nuclear Facilities*
- What You Need to Know About AISC 341 and the 4th Ed. *Seismic Design Manual*

Seismic

- BRB's and Existing Buildings: Retrofitting Existing Structures to Minimize Schedule and Maximize Efficiency, Profit, and Resilience
- Pros and Cons of SFR Systems
- Resilient Seismic Design of Steel Structures: Can We Deliver on the Promise?— Current Views from Past Higgins Award Winners
- Seismic Evaluation and Rehabilitation of Existing Steel Structures
- Simplifying the Implementation of Dampers with Moment Frames to Save Steel and Increase Resiliency
- Structural Inspections for Structures Designed to *Seismic Provisions*
- To 3, or Not To 3
- Touching Base: Seismic Design and Performance Assessment of Column Base Connections
- What Seismic Steel Design Is All About
- What's the Deal with Appendix 1: Advanced Analysis in AISC 341

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<< NASCC SESSIONS

Sustainability

- A Landmark Case Study on Steel Reuse: The Boulder Community Hospital
- Advancing Steel Sustainability: What Owners Need to Know
- AISC Sustainability Partner Program: What's in it for You?
- Buy Clean Policies – Where Are We Today?
- Buying Green Steel: What, Why, and How?
- Embodied Carbon of Construction Materials: What's in the Numbers
- LEED v5 and What You Need to Know for Your Steel Structures
- Pursuit of Net-Zero: Design Strategies to Leverage Structural Steel to Reduce Embodied Carbon
- Sneak Peak – the AISC Sustainability Design Guide
- SteelEPD – How the EPA is Helping to Transform the Steel Industry
- Sustainable Steel: What Are the Mills Doing?
- Teamwork Makes the Dream Work – Workshopping Sustainability
- The Sustainability World Beyond A3 – Transport and Job Site Considerations

Technology

- 3D-Printed Pedestrian Steel Bridge
- AI Applications for Steel Fabricators
- AISC's AI Initiatives: An Introduction
- Augmented Reality in Structural Steel Construction
- Better Bridges: How Creating a Culture of Innovation and Harnessing AI Helped Aetna Bridge Streamline Quality and Certification Processes
- Database Driven Design Methods
- Real Life AI Applications for Structural Engineers
- Realty Capture and Digital Twins in Steel
- Technology, Machine Learning, and AI in Steel: Current Applications and Future Innovations
- The Basics of AI
- The Efficiency of the Connected Model

Workforce Development

- Building a Resilient Workforce: Insights from SE3 on Compensation, Engagement, and Well-being
- Creative Solutions for Shop Talent Recruitment: Working with Your Local Workforce Development Organizations
- How will AI and Robotics Impact Your Workforce?
- Partnerships in Action: The Workforce of Tomorrow is Today
- Start Them Young: Accessing Youth Apprenticeships for Your Organization
- Strong as Steel: Building Mental Might
- Summer Camp Just Got a Heavy Metal Makeover: Innovative Workforce Solutions For Your Business Needs
- The Ins and Outs of AISC's New Fabricator Training Program
- Women in the Steel Trades: Not just a great "Girl Welder"
- Workforce Development Turned Upside Down: An Educational Partnership Case Study

SUBCONFERENCE SESSIONS

World Steel Bridge Symposium

- A Competitive Short Span Steel Railway Bridge Concept
- Advancing the Industry With Bi-Metal Welding
- Arch-itectural Bridges: Innovations in Steel Network Tied Arch Bridges
- Bridge Steel Welds and Weld Repairs – Toughness of HAZs and How Many Repairs is too Many?
- Building Bridges: Insights from Leading Steel Fabricators
- Constructability Design Requirements for Steel I-Girder Bridges
- DOT In-house Design Showcase
- Fun With Fracture
- Innovative Railroad Bridge Projects
- International Steel Bridges
- Kentucky Transportation Cabinet Welcome and Project Highlight
- Lateral and Cross Frames for Permanent and Temporary Conditions
- PBTG's/Kit-of-Parts: You Can Build It!
- Performance Testing of Coatings for Corrosion Protection of Steel Bridges
- Rehabilitation Techniques for Steel Bridges
- Simplifying Steel Girder Design
- Steel Bridges – Unique Solutions to Complex Design Challenges
- Steel for the Lift You Need
- Sustainability – Where Steel Shines
- The Latest AASHTO/NSBA Collaboration Documents
- The New Frederick Douglass Bridge – Three Different Perspectives
- Ultra-Modern Cable-Stayed Solutions for the Chester Mississippi River Crossing
- Unmanned Aircraft Systems (Drones) for Bridge Inspection
- What Engineers and Erectors Should Know About Bolts in Steel Bridges

Architecture in Steel

- Architectural Design of the Dublin Link Pedestrian Bridge
- Architecturally Exposed Structural Steel: Best Practices for Clear Communication
- Building Sustainably With Steel: A Holistic Approach to Life Cycle Assessment
- Designing With Steel: 45 Proven Cost-Saving Strategies for Architects
- Efficiently Delivering Amazing Architectural Stairs
- Making a Case for Steel Castings in Construction
- Marrying Membranes to Steel Structures
- Resilient and Sustainable Structures
- Visual Appeal of Steel
- X-Factor: The First Mass Customized Signature Bridge

QualityCon

- A Moment (Connection) of Terror!
- Advanced Root Cause: Because "It Just Happened" Isn't an Answer
- Being the Captain of your Ship
- Best Coating Practices: Taking the PAIN out of PAINt
- Best Practices for Structural Steel Fabricators Using Intumescent Coatings
- Beyond Inspection: Building a Robust Quality Culture on the Jobsite
- Bolted Down: Securing Quality in Structural Steel Connections
- Certification Forum
- Chapter M – Fabrication and Erection
- Five Reasons to Write a Nonconformance Report
- I'm a New QCI—Now What?
- Inspection for Fabricators and Erectors: What Does the Building Code Require
- Is your Robot Calibrated?
- Preheating for Structural Welding – AWS D1.1 Table 5.8 and Annex B versus AWS D14.8M
- Prospectives on Chapter N: Quality Control and Quality Assurance
- Quality Coatings—Get it Right or Face Costly Rework
- Quality of Steel Bridge Materials: Imperfections and Inspections
- Shop Welding Fundamentals for D1.1
- Three More Fabricators Walk Into a Bar...
- Updates to D1.5 Welding Code
- Using Your Management Review to Improve Your Company and QMS

NISD Conference on Steel Detailing

- Ask a Detailer
- Connection Design Basics for Steel Detailers
- Construction AI: Practical Case Studies for IT Leaders
- Design Drawings – Detailers and Engineers Working Together
- Errors and Omissions Insurance – Coverage for Your Mistakes
- Get Involved: How the NISD Supports Detailers and the Industry
- How to Recognize a Quality Steel Detailer
- Legal Lessons Learned With Building Information Modeling (BIM)
- Outside Detailing – Finding the Right Fit
- Steel Joists – Detailing and Design Fundamentals
- Tips and Tricks for Learning New Detailing Software
- What the NISD Does to Support the Steel Detailing Industry
- Why Do Steel Detailing Changes Cost so Much?

SSRC Annual Stability Conference

- 2025 Beedle Lecture: Todd Helwig
- Analysis Methods I
- Analysis Methods II
- Bridges
- Buildings I
- Buildings II
- Experiments in Thin-Walled Structures
- Extreme Loads
- Floors and Roofs
- Frames and Systems
- MAJR Medal Presentation
- Special Topics I
- Special Topics II
- SSRC Annual Business Meeting
- SSRC Task Group Meetings I
- SSRC Task Group Meetings II
- SSRC Task Group Overview
- SSRC Welcome Session
- Stainless Steel and Aluminum
- Thin-Walled Structures I
- Thin-Walled Structures II

SafetyCon

Session list can be found at **aisc.org/nascc**.

And more! Visit **aisc.org/nascc** for a full list of sessions.

NASCC: THE STEEL CONFERENCE
EXHIBITOR LIST—ALPHABETICAL
(As of 11.15.24)

Visit **aisc.org/nascc** to locate exhibitors on our floor plan.

Color Key:
Bridge Pavilion Exhibitor
Partner Pavilion Exhibitor
Heavy Machinery Area

3D Engineering Global LLC
www.3deglobal.com

AA Anchor Bolt, Inc.
www.aaanchorbolt.com

Abrafast.com / The Blind Bolt Co.
www.abrafast.com

Accurate Perforating
www.accurateperforating.com

Acrow Bridge
www.acrow.com

Action Stainless & Alloys
www.actionstainless.com

AFF Design Services Inc.
www.affsteel.com

AGT Robotics
www.agtrobotics.com

AISC Bookstore
aisc.org/publications

AISC Education Foundation
aisc.org/giving

AKS Cutting Systems
akscutting.com

AKYAPAK USA
www.akyapak.com

Albina Co. Inc.
www.albinaco.com

Allfasteners
allfasteners.com

Allied Machine & Engineering
www.alliedmachine.com

ALTAIR
altair.com

American Galvanizers Association
galvanizeit.org

American Institute of Steel Construction (AISC)
www.aisc.org

American Punch Company
americanpunchco.com

American Society for Nondestructive Testing (ASNT)
www.asnt.org

American Steel Detailing, LLC
www.americansteeldetailing.com

American Welding Society
www.aws.org

AMPP
ampp.org/home

Anatomic Iron Steel Detailing
www.anatomiciron.com

Applied Bolting Technology, Inc.
www.appliedbolting.com

ArcelorMittal International
ami.arcelormittal.com/structural-shapes

Armatherm Thermal Bridging Solutions
www.armatherm.com

Arteras Inc.
arteras-inc.com

ASC Steel Deck
ascsd.com

Association of Women in the Metal Industries
www.awmi.org

Atema Inc.
www.atema.com

ATF WORLD Inc.
www.atfworld.com

Atlas Tube
www.atlastube.com

Autodesk
www.autodesk.com/solutions/aec/bim/structural-engineering

Automated Layout Technology LLC
www.automatedlayout.com

AZZ Metal Coatings
www.azz.com

Baco Enterprises Inc.
www.bacoent.com

Badger Products
www.badgerproductsusa.com

Bamal Fastener Corporation
www.bamal.com

Baumann USA
www.baumannusa.com

Bay Standard Manufacturing
www.baystandard.com

Ben Hur Construction Co.
www.benhurconstruction.com

Bend-Tech
www.bend-tech.com

Bentley Systems, Incorporated
www.bentley.com

Birmingham Fastener
www.bhamfast.com

Blackstone Group Technologies
bgtek.com

Blair Corporation
www.blairwirerope.com

Bluebeam Inc.
www.bluebeam.com

Brainstorm Infotech
www.brainstorminfotech.co.in

Brown Strauss Steel
www.brownstrauss.com

Bryzos
www.bryzos.com

Bull Moose Tube Company
www.bullmoosetube.com

C.M. Mockbee Co.
mockbee.com

CADeploy, Inc.
www.cadeploy.com

CAI Software
www.radley.com/material-traceability

Caldim Tech Services LLC
caldimengg.com

CAMBCO, Inc.
www.cambcoinc.com

Canam
www.canam.com

Cano Steel
www.canosteel.com

Carboline
www.carboline.com

Cascade Nut and Bolt Company
www.cascadenutandbolt.com

CAST CONNEX
www.castconnex.com

Cerbaco Ltd.
www.cerbaco.com

Charlie Irwin Painting, LLC (CIP)
www.cipaint.com

Chicago Clamp Company
www.chicagoclampcompany.com

Chicago Jack Service, Inc.
www.chicagojack.com

Chicago Metal Rolled Products
www.cmrp.com

Cleveland City Forge
www.clevelandcityforge.com

Cleveland Punch & Die Co.
www.clevelandpunch.com

Cleveland Steel Tool
www.clevelandsteeltool.com

ClimaSpec
www.climaspec.com

Color Works Painting, Inc.
www.ColorWorksPainting.com

Columbia Safety and Supply
www.colsafety.com

Combilift
www.combilift.com

COMSLAB
www.comslab-usa.com

Con-Serv Inc.
www.con-servinc.com

Consolidated Pipe & Supply Company
www.consolidatedpipe.com

Controlled Automation, Inc.
www.controlledautomation.com

Copper State Bolt & Nut Co.
www.copperstate.com

CoreBrace
www.corebrace.com

CSC – Canam Steel Corporation
cscsteelusa.com

Cutting Edge Steel & Stair
cesteel.com

CWB Group
www.cwbgroup.org

D.S. Brown
dsbrown.com

DACS, Inc.
www.dacsinc.com

Daito Seiki Co., LTD
www.daitousa.com

Danny's Construction Company, LLC
www.dannysconstruction.com

DAVI, Inc.
www.davi.com

DBM VirCon
www.dbmvircon.com

Delta Steel
www.deltasteel.com

DGS Technical Services, Inc.
www.dgsts.com

Dlubal Software, Inc.
www.dlubal.com/en

Doerken Coatings
www.doerken.com/us/en/doerken-coatings

Drivensteel Inc.
www.drivensteel.com

DuraFuse Frames
www.durafuseframes.com

Dyson Corp.
www.dysoncorp.com

Eastern Pneumatics & Hydraulics, Inc./ McCann Equipment Ltd.
www.ephtools.com

EHS Momentum, LLC
www.ehsmomentum.com

EMI
www.emiworks.com

ENERCALC
enercalc.com

Engineered Rigging
engineeredrigginggroup.com

Enidine
www.itt-infrastructure.com

EPAcoat, Inc.
epacoat.com

EVER Seismic
www.everseismic.com

Exact Detailing Ltd.
www.exactdetailing.com

Fabreeka International, Inc.
www.fabreeka.com

Fabricators & Manufacturers Association
fmamfg.org

FabStation
fabstation.com

FACCIN U.S.A. Inc.
www.faccingroup.com

FATZER AG
www.fatzer.com

FICEP Corporation
www.ficepcorp.com

Fickett Structural Solutions
www.fickettinc.com

Flame On, Inc.
flameoninc.com

Fontana Fasteners, Inc.
www.fontanagruppoagtna.com

GEKA USA
www.gekaus.com

Gerdau
www.gerdau.com

GH Cranes & Components
www.ghcranes.com

GIZA
www.gizasteel.com

Gonza Joist
gonzaglobal.com/en/gonza-joist

Graitec
www.graitec.com

Grating Fasteners
www.gclips.com

Great River Economic Development Foundation
www.cottontosteel.com

Greenbrook Engineering Services
greenbrookengineering.com

GRM Custom Products
www.grmcp.com

Gsource Technologies LLC
www.gsourcedata.com

GWY, LLC
www.gwyinc.com

Harbor Fab
www.harborfab.com

Haydon Bolts, Inc.
www.haydonbolts.com

Hercules Bolt Company
www.herculesbolt.com

HEXAGON
hexagon.com

HGG Profiling Equipment BV
hgg-group.com

Hilti Inc.
www.hilti.com

HI-Q DESIGN Inc.
www.hiqdesigninc.com

Holemaker Technology HMT
www.holemaker-technology.com

Holloway Houston, Inc.
www.hhilifting.com

HRV Conformance Verification Associates, Inc.
www.hrvinc.com

HYTORC
www.hytorc.com

IAPMO Uniform Evaluation Service
www.uniform-es.org

IDEA StatiCa US LLC
www.ideastatica.com

IES, Inc.
www.iesweb.com

IKG
ikg.com

Indiana Grating PVT LTD
www.indianagroup.com

Infasco
www.infasco.com

Informed Infrastructure
informedinfrastructure.com

InfoSight Corporation
www.infosight.com

Infra-Metals Co.
www.infra-metals.com

Innovatech
www.innova.tech

Innovative Transport Solutions (ITS)
innovativetransportsolutions.com

International Design Services, Inc.
www.ids-inc.net

International Zinc Association
www.zinc.org

Interstate Gratings
www.interstategratings.com

Ironworkers / IMPACT
www.impact-net.org

IRyS Global Inc.
www.irysglobal.com

ISC
www.inventorysales.com

ISD Group USA
www.isdgroup.us

J. B. Long, Inc.
www.jblong.com

JH Botts LLC
www.jhbotts.com

Jinan Acme CNC Equipment Co., Ltd.
www.acme-laser.com

JMT Consultants Inc.
www.jmtconsultants.com

John A. Papalas & Co.
www.johnapapalasco.com

JPW Engineering Services
www.jpwespl.com

KALTENBACH
www.kaltenbach.com

Kinetic Cutting Systems, Inc.
www.kineticusa.com

King Steel Corporation
www.kingsteelcorp.com

Kloeckner Metals
www.kloecknermetals.com

Kobelco Welding of America, Inc.
www.kobelcowelding.com

Kottler Metal Products, Inc.
www.kottlermetal.com

KTA-Tator
kta.com

LAP Laser LLC
www.lap-laser.com

LARSA, Inc.
www.larsa4d.com

LECGI Structural Engineering & Detailing
lecgi.us

LeJeune Bolt Company
www.lejeunebolt.com

Lichtgitter USA
www.lichtgitterusa.com

Lincoln Electric
www.lincolnelectric.com

Lindapter
www.Lindapter.com

LS Industries
www.lsindustries.com

LTC Software Solutions
ltcsoftwaresolutions.com

LTC Virtual Design and Construction
www.LTCvdc.com

LUSAS
www.lusas.com

Machitech Automation
www.beamcut.com

Magni Telescopic Handlers
www.MagniTH.com

Magnum Consulting
www.4magnum.com

MARKO Metal Systems
www.markosys.com

Maruichi Leavitt Pipe and Tube
www.maruichi-leavitt.com

Max Weiss Co., LLC
www.maxweiss.com

McLaren Engineering Group
www.mgmclaren.com

Messer Cutting Systems
us.messer-cutting.com

Metals USA
www.metalsusa.com

MetFin Shotblast Systems
www.metfin.com

Meyer Borgman Johnson
www.mbjeng.com

Mid Atlantic Global
www.midatlanticglobal.com

Miller Electric Mfg. LLC
www.millerwelds.com

Miner Grating Systems, a Powerbrace Company
www.minergrating.com

MOLD-TEK Technologies Inc.
www.moldtekengineering.com

MORE EXHIBITORS >>

<< MORE EXHIBITORS

(As of November 15, 2024)

Color Key:
Bridge Pavilion Exhibitor
Partner Pavilion Exhibitor
Heavy Machinery Area

National Institute of Steel Detailing, Inc.
www.nisd.org

National Steel Bridge Alliance
aisc.org/nsba

New Millennium
www.newmill.com

Nexus Steel Detailing, Inc.
www.nexus-es.com

Nitto Kohki U.S.A., Inc.
www.nittokohki.com

North Shore Steel
nssco.com

Nucor – Beam Mill Group
www.nucoryamato.com

Nucor – Corporation
www.nucor.com

Nucor – Fastener Division
www.nucor-fastener.com

Nucor – Plate Mill Group
nucor.com/products/steel/plate

Nucor Skyline
www.nucorskyline.com

Nucor Tubular Products
www.nucortubular.com

Nucor Vulcraft/Verco Group
www.vulcraft.com

NuWave Laser Cleaning
www.nuwavelaser.com

Ocean Machinery, Inc.
www.oceanmachinery.com

Ohio Gratings, Inc.
www.ohiogratings.com

OpenBrIM Platform
openbrim.org

OTH Pioneer Rigging
othrigging.com

Ovation Services LLC
www.4ovation.com

P2 Programs
www.p2programs.com

Pacific Stair Corporation
www.pacificstair.com

Pan Gulf Technologies
www.pangulftech.com

Paramount Roll and Forming, Inc.
www.paramountroll.com

Peddinghaus Corporation
www.peddinghaus.com

Pioneer Machine Sales
www.pioneermachinesales.com

Portland Bolt & Manufacturing Company
www.portlandbolt.com

Power of Design Group, LLC
www.podgrp.com

PPG Protective & Marine Coatings
www.ppgpmc.com

Precision Steel Systems
www.precisionsteelsystems.com

Prodevco Robotic Solutions Inc.
www.prodevcoind.com

Project + Quality Solutions
www.projectqualitysolutions.com

Qnect LLC
www.qnect.com

Qualis Solutions, LLC
www.qualissolutions.com

Qubatic Steel Detailing LLC
www.qubatic.com

R.J. Watson, Inc.
www.rjwatson.com

RBC Lubron Bearing Systems Inc.
www.rbcbearings.com

Red Cedar Steel
www.redcedarsteel.com

Research Council on Structural Connections
www.boltcouncil.org

RISA
www.risa.com

Rolling Plains Construction, Inc.
www.rollingplains.com

SCHULLER&Company
www.bocad.com

SDS2 by ALLPLAN
www.sds2.com

Seismic Bracing Company
www.thesbcllc.com

Serviacero USA
www.serviacero.com

Service Steel Warehouse
www.servicesteel.org

SERVO-ROBOT
www.servorobot.com

SEU (formerly SE University) by SE Solutions
www.LearnWithSEU.com

Shandong Hanpu Machinery Industrial Co., LTD
www.hanpuindustrial.com

Shannon Galvanizing
www.shannongalvanizing.com

Sherwin-Williams Protective and Marine
protective.sherwin.com

Shop Data Systems, Inc.
www.shopdata.com

Short Span Steel Bridge Alliance
www.shortspansteelbridges.org

SidePlate / MiTek
www.mii.com

Simpson Strong-Tie Co.
www.strongtie.com

Skidmore-Wilhelm
www.skidmore-wilhelm.com

SkyCiv Engineering
skyciv.com

Soitaab USA Inc.
www.soitaabusa.com

South Atlantic Galvanizing
www.southatlanticllc.com

St. Louis Screw & Bolt
slbolt.com

Stainless Structurals
www.stainless-structurals.com

Steel and Pipe Supply
www.SteelAndPipe.com

Steel Deck Institute
www.sdi.org

Steel Dimensions India (Pvt) Ltd.
steeldimensions.ca

Steel Dynamics Long Products Group
lpg.steeldynamics.com

Steel Erectors Association of America
www.seaa.net

Steel Founders' Society of America
www.sfsa.org

Steel Joist Institute
www.steeljoist.org

Steel Plate
www.steelplate.us

Steel Plus Network
www.steelplus.com

Steel Tek Unlimited
www.steelteku.com

Steel Tube Institute
www.steeltubeinstitute.org

Steelweb Inc.
steelweb.com

Structural Bolt and Manufacturing, Inc.
www.structuralbolt.com

Structural Engineering Institute of ASCE
asce.org/SEI

Structural Stability Research Council (SSRC)
www.ssrcweb.org

Structures Online
www.structuresonline.net

STRUMIS LLC
www.strumis.com

Struzon Technologies Inc.
struzon.com

Sugar Steel Corporation
www.sugarsteel.com

Sumter Coatings, Inc., an Ergon Company
www.sumtercoatings.com

Superior Glove
superiorglove.com

Swisher Tools, LLC
www.swishertools.com

SY Stairs
www.systairs.com

TDS Industrial Services Ltd.
www.tdsindustrial.com

Team Detailing Solutions LLC
teamdetailing.com

Techflow Inc.
www.techflowengg.com

Tecoi USA
tecoiusa.com

Tectonix Steel, Inc.
www.tectonixsteel.com

Terracon Consultants, Inc.
www.terracon.com

The Walsh Group
www.walshgroup.com

Threaded Fasteners, Inc.
threadedfasteners.com

Threadline Products, Inc.
threadlineproducts.com

Trilogy Machinery, Inc.
www.TrilogyMachinery.com

Trimble
www.tekla.com/us

Triple-S Steel / Intsel Steel
www.sss-steel.com

TRU-FIT PRODUCTS
tfpcorp.com

United Structure Detailing Inc.
unitedstructuredetailing.com

V&S Galvanizing
www.hotdipgalvanizing.com

Valmont Coatings
www.valmontcoatings.com

Vectis Automation
www.VectisAutomation.com

Vegazva Technologies
www.vegazva.com

Viking Wheel Blast Systems
www.vikingcorporation.com

VIRTUELE
www.virtuele.us

voestalpine Tubulars
www.voestalpine.com/tubulars/en

Voortman Steel Machinery
www.voortman.net

Voss Engineering, Inc.
www.vossengineering.com

Welded Tube of Canada
www.weldedtube.com

Whiteboard Technologies LLC
www.whiteboardtec.com

Willbanks Metals Inc.
www.willbanksmetals.com

Wrought Washer
www.wroughtwasher.com

Wurth Construction Services
www.wurthindustry.com/construction

Wuxi Zhouxiang Laser Machinery Co., Ltd.
www.wxzhouxiang.com

X SERIES USA
www.xseriesusa.com

NASCC: THE STEEL CONFERENCE
EXHIBITOR LISTS—CONNECT BY CATEGORY
(As of November 15, 2024)

1 Bar Coding Systems and Equipment
Armatherm Thermal Bridging Solutions
CAI Software
EHS Momentum, LLC
InfoSight Corporation
P2 Programs

2 Bender/Roller
AKYAPAK USA
Albina Co. Inc.
Armatherm Thermal Bridging Solutions
Baco Enterprises Inc.
CAMBCO, Inc.
Chicago Metal Rolled Products
DAVI, Inc.
FACCIN U.S.A. Inc.
Kottler Metal Products, Inc.
Max Weiss Co., LLC
Paramount Roll and Forming, Inc.
Trilogy Machinery, Inc.

Exhibitors in this list are divided by category to make it easier to find companies you'd like to connect with in Louisville.

3 Bolting and Anchoring Systems
AA Anchor Bolt, Inc.
Abrafast.com / The Blind Bolt Co.
Allfasteners
Applied Bolting Technology, Inc.
Armatherm Thermal Bridging Solutions
Baco Enterprises Inc.
Bamal Fastener Corporation
Bay Standard Manufacturing
Birmingham Fastener
C.M. Mockbee Co.
Canam
Cascade Nut and Bolt Company
Chicago Clamp Company
Chicago Jack Service, Inc.
Copper State Bolt & Nut Co.
Dyson Corp.
Fontana Fasteners, Inc.
Hercules Bolt Company
HYTORC
Infasco
JH Botts LLC
LeJeune Bolt Company
Lindapter
Nucor – Fastener Division
Portland Bolt & Manufacturing Company
Red Cedar Steel
Research Council on Structural Connections
Shandong Hanpu Machinery Industrial Co., LTD
St. Louis Screw & Bolt
Structural Bolt and Manufacturing, Inc.
Threaded Fasteners, Inc.
Threadline Products, Inc.
TRU-FIT PRODUCTS
Wrought Washer
Wurth Construction Services

4 Bridge Components and Systems
AA Anchor Bolt, Inc.
Acrow Bridge
ALTAIR
Applied Bolting Technology, Inc.
Armatherm Thermal Bridging Solutions
CAST CONNEX
Cleveland City Forge
Con-Serv Inc.
Consolidated Pipe & Supply Company
Controlled Automation, Inc.
D.S. Brown
DGS Technical Services, Inc.
Dyson Corp.
Fabreeka International, Inc.
FATZER AG
FICEP Corporation
Flame On, Inc.
GEKA USA
Graitec
GRM Custom Products
Haydon Bolts, Inc.
ISC
National Steel Bridge Alliance (NSBA)
Nucor – Corporation
Nucor Skyline
R.J. Watson, Inc.
RBC Lubron Bearing Systems Inc.
Short Span Steel Bridge Alliance
Threaded Fasteners, Inc.
Valmont Coatings
Voss Engineering, Inc.
Wrought Washer
Wuxi Zhouxiang Laser Machinery Co., Ltd.

5 Career Services
American Society for Nondestructive Testing (ASNT)
American Welding Society
Fabricators & Manufacturers Assoc.

6 Coatings and Fire Protection
AMPP
Carboline
Charlie Irwin Painting, LLC (CIP)
Color Works Painting, Inc.
Doerken Coatings
EPAcoat, Inc.
International Zinc Association
John A. Papalas & Co.
PPG Protective & Marine Coatings
Rolling Plains Construction, Inc.
Sherwin-Williams Protective and Marine
Sumter Coatings, Inc., an Ergon Company
Valmont Coatings
Wurth Construction Services

7 Construction and Project Mgmt.
Acrow Bridge
American Galvanizers Association
ATF WORLD Inc.
Ben Hur Construction Co.
DBM VirCon
EPAcoat, Inc.
Flame On, Inc.
Haydon Bolts, Inc.
ISD Group USA
KTA-Tator
Steel Dimensions India (Pvt) Ltd.
Wuxi Zhouxiang Laser Machinery Co., Ltd. >>

<< CONNECT BY CATEGORY

8 Cranes and Lifts

Baumann USA
Chicago Jack Service, Inc.
Combilift
Engineered Rigging
GH Cranes & Components
Holloway Houston, Inc.
Magni Telescopic Handlers

9 Detailers

3D Engineering Global LLC
AFF Design Services Inc.
American Steel Detailing, LLC
Anatomic Iron Steel Detailing
Arteras Inc.
Blackstone Group Technologies
Brainstorm Infotech
CADeploy, Inc.
Caldim Tech Services LLC
Canam
DGS Technical Services, Inc.
Drivensteel Inc.
Exact Detailing Ltd.
GIZA
Greenbrook Engineering Services
Gsource Technologies LLC
HI-Q DESIGN Inc.
International Design Services, Inc.
IRyS Global Inc.
J. B. Long, Inc.
JMT Consultants Inc.
JPW Engineering Services
LECGI Structural Engineering & Detailing
LTC Virtual Design and Construction
Magnum Consulting
McLaren Engineering Group
MOLD-TEK Technologies Inc.
National Institute of Steel Detailing, Inc.
New Millennium
Nexus Steel Detailing, Inc.
Ovation Services LLC
Pan Gulf Technologies
Qualis Solutions, LLC
Qubatic Steel Detailing LLC
SCHULLER&Company
SDS2 by ALLPLAN
Steel Dimensions India (Pvt) Ltd.
Steel Tek Unlimited
Steelweb Inc.
Structures Online
Struzon Technologies Inc.
TDS Industrial Services Ltd.
Team Detailing Solutions LLC
Techflow Inc.
Tectonix Steel, Inc.
Trimble
United Structure Detailing Inc.
VIRTUELE
Whiteboard Technologies LLC

10 Engineering Consulting

3D Engineering Global LLC
Acrow Bridge
AFF Design Services Inc
Allied Machine & Engineering
Anatomic Iron Steel Detailing
Atema Inc.
ATF WORLD Inc.
CADeploy, Inc.
Caldim Tech Services LLC
CWB Group
DGS Technical Services, Inc.
DuraFuse Frames
Engineered Rigging
Exact Detailing Ltd.
GIZA
Graitec
Greenbrook Engineering Services
GRM Custom Products
Gsource Technologies LLC
HI-Q DESIGN Inc.
HRV Conformance Verification Associates, Inc.
IAPMO Uniform Evaluation Service
Infasco
International Design Services, Inc.
IRyS Global Inc.
ISD Group USA
JMT Consultants Inc.
KTA-Tator
LECGI Structural Eng. & Detailing
LUSAS
Magnum Consulting
McLaren Engineering Group
Meyer Borgman Johnson
MOLD-TEK Technologies Inc.
New Millennium
Pan Gulf Technologies
Power of Design Group, LLC
Qubatic Steel Detailing LLC
SidePlate / MiTek
Steel Dimensions India (Pvt) Ltd.
Steel Founders' Society of America
Steel Tube Institute
Team Detailing Solutions LLC
Terracon Consultants, Inc.
United Structure Detailing Inc.
Vegazva Technologies

11 Erectors

AFF Design Services Inc
Ben Hur Construction Co.
Danny's Construction Co., LLC
GWY, LLC
Ironworkers / IMPACT
Red Cedar Steel
Swisher Tools, LLC
Trimble
The Walsh Group

12 Galvanizers

American Galvanizers Association
AZZ Metal Coatings
Doerken Coatings
Infasco
Portland Bolt & Manufacturing Co.
Shannon Galvanizing
South Atlantic Galvanizing
Threaded Fasteners, Inc.
V&S Galvanizing
Valmont Coatings

13 Grating and Grating Fasteners

Grating Fasteners
IKG
Indiana Grating PVT LTD
Interstate Gratings
Lichtgitter USA
Miner Grating Systems, a Powerbrace Company
Ohio Gratings, Inc.
Serviacero USA
Soitaab USA Inc.

14 Hand Tools/ Portable Equipment & Accessories

Allied Machine & Engineering
American Punch Company
Badger Products
Chicago Jack Service, Inc.
Cleveland Punch & Die Co.
Cleveland Steel Tool
Columbia Safety and Supply
Eastern Pneumatics & Hydraulics, Inc./ McCann Equipment Ltd.
GH Cranes & Components
GRM Custom Products
GWY, LLC
Hilti Inc.
Holemaker Technology HMT
HYTORC
Innovative Transport Solutions (ITS)
ISC
KTA-Tator
LS Industries
NuWave Laser Cleaning
Shandong Hanpu Machinery Industrial Co., LTD
TRU-FIT PRODUCTS
Vectis Automation
Wurth Construction Services

15 HSS Manufacturers

Atlas Tube
Bull Moose Tube Company
Maruichi Leavitt Pipe and Tube
Nucor Tubular Products
Serviacero USA
Steel Founders' Society of America
Steel Tube Institute
Welded Tube of Canada

16 Joists and Deck

AFF Design Services Inc.
ASC Steel Deck
ATF WORLD Inc.
Canam
Cleveland Punch & Die Co.
COMSLAB
CSC – Canam Steel Corporation
DACS, Inc.
GEKA USA
Gonza Joist
IAPMO Uniform Evaluation Service
MARKO Metal Systems
New Millennium
Nucor – Corporation
Nucor Vulcraft/Verco Group
Steel Deck Institute
Steel Joist Institute
Team Detailing Solutions LLC

17 Marking and Traceability

Messer Cutting Systems
Soitaab USA Inc.

18 Materials/ Engineering/ Testing and Inspection

Accurate Perforating
American Galvanizers Association
American Society for Nondestructive Testing (ASNT)
American Welding Society
AMPP
Carboline
ClimaSpec
CWB Group
Doerken Coatings
Dyson Corp.
Engineered Rigging
Fickett Structural Solutions
Holloway Houston, Inc.
HRV Conformance Verification Associates, Inc.
IAPMO Uniform Evaluation Service
KTA-Tator
Project + Quality Solutions
Steel Founders' Society of America
Terracon Consultants, Inc.
Wrought Washer

19 Mills

ArcelorMittal International
Gerdau
Nucor – Beam Mill Group
Nucor – Plate Mill Group
Stainless Structurals
Steel Dynamics Long Products Group
voestalpine Tubulars
Welded Tube of Canada

20 Other

AA Anchor Bolt, Inc.
Accurate Perforating
AISC Book Store
Allied Machine & Engineering
American Institute of Steel Construction (AISC)
American Punch Company
American Society for Nondestructive Testing (ASNT)
American Welding Society
Association of Women in the Metal Industries
Badger Products
Blair Corporation
C.M. Mockbee Co.
Caldim Tech Services LLC
Cleveland Punch & Die Co.
ClimaSpec
Columbia Safety and Supply
Consolidated Pipe & Supply Co.
CWB Group
Enidine
Fabricators & Manufacturers Assoc.
Graitec
Great River Economic Development Foundation
Holloway Houston, Inc.
Informed Infrastructure
Ironworkers / IMPACT
IRyS Global Inc.
Jinan Acme CNC Equipment Co., Ltd.
John A. Papalas & Co.
LAP Laser LLC
MetFin Shotblast Systems
National Steel Bridge Alliance
Nitto Kohki U.S.A., Inc.
OTH Pioneer Rigging
Research Council on Structural Connections
SERVO-ROBOT
SEU (formerly SE University) by SE Solutions
Simpson Strong-Tie Co.
Steel Erectors Assoc. of America
Steel Plate
Steel Plus Network
Structural Engineering Institute of ASCE
Structural Stability Research Council
Superior Glove
Tecoi USA
Viking Wheel Blast Systems
Voss Engineering, Inc.
Whiteboard Technologies LLC
X SERIES USA

21 Safety Equipment

Applied Bolting Technology, Inc.
Badger Products
Chicago Clamp Company
Chicago Jack Service, Inc.
Columbia Safety and Supply
EHS Momentum, LLC
GWY, LLC
HYTORC
Innovative Transport Solutions (ITS)
Ohio Gratings, Inc.
OTH Pioneer Rigging
Skidmore-Wilhelm
Wurth Construction Services

22 Software

ALTAIR
Autodesk
Bend-Tech
Bentley Systems, Incorporated
Bluebeam Inc.
Bryzos
CAI Software
Controlled Automation, Inc.
Dlubal Software, Inc.
EHS Momentum, LLC
ENERCALC
FabStation
FICEP Corporation
GIZA
Graitec
Gsource Technologies LLC
HEXAGON
IDEA StatiCa US LLC
IES, Inc.
International Design Services, Inc.
IRyS Global Inc.
ISD Group USA
LARSA, Inc.
LTC Software Solutions
LUSAS
Messer Cutting Systems
OpenBrIM Platform
P2 Programs
Prodevco Robotic Solutions Inc.
Qnect LLC
RISA
SCHULLER&Company
SDS2 by ALLPLAN
Shop Data Systems, Inc.
Simpson Strong-Tie Co.
SkyCiv Engineering
Steel Dimensions India (Pvt) Ltd.
Steel Tek Unlimited
STRUMIS LLC
Trilogy Machinery, Inc.
Trimble
Voortman Steel Machinery

23 Stairs/Railings and Misc. Steel

Accurate Perforating
Anatomic Iron Steel Detailing
Bend-Tech
Cutting Edge Steel & Stair
Innovative Transport Solutions (ITS)
ISD Group USA
Pacific Stair Corporation
Red Cedar Steel
SCHULLER&Company
SY Stairs
Team Detailing Solutions LLC
Trimble
X SERIES USA

24 Stationary Fabrication Equipment

AGT Robotics
AKS Cutting Systems
Automated Layout Tech. LLC
Bend-Tech
Cleveland Punch & Die Co.
Cleveland Steel Tool
Controlled Automation, Inc.
Daito Seiki Co., LTD
DAVI, Inc.
Eastern Pneumatics & Hydraulics, Inc./ McCann Equipment Ltd.
EMI
FICEP Corporation
GEKA USA
HGG Profiling Equipment BV
Innovatech
Jinan Acme CNC Equipment Co., Ltd.
KALTENBACH
Kinetic Cutting Systems, Inc.
Lincoln Electric
LS Industries
Machitech Automation
Messer Cutting Systems
MetFin Shotblast Systems
Ocean Machinery, Inc.
Peddinghaus Corporation
Pioneer Machine Sales
Precision Steel Systems
Prodevco Robotic Solutions Inc.
Soitaab USA Inc.
Trilogy Machinery, Inc.
Vectis Automation
Viking Wheel Blast Systems
Voortman Steel Machinery
Wuxi Zhouxiang Laser Machinery Co., Ltd.
X SERIES USA

25 Steel Service Centers

Action Stainless & Alloys
Baco Enterprises Inc.
Brown Strauss Steel
Cano Steel
Consolidated Pipe & Supply Co.
Delta Steel
Infra-Metals Co.
King Steel Corporation
Kloeckner Metals
Metals USA
North Shore Steel
Serviacero USA
Service Steel Warehouse
Soitaab USA Inc.
Steel and Pipe Supply
Steel Founders' Society of America
Steel Plate
Sugar Steel Corporation
Triple-S Steel / Intsel Steel
Willbanks Metals Inc.

26 Structural Systems and Components

Acrow Bridge
AKYAPAK USA
Allied Machine & Engineering
ALTAIR
Applied Bolting Tech., Inc.
Bend-Tech
C.M. Mockbee Co.
Caldim Tech Services LLC
CAST CONNEX
Chicago Clamp Company
Cleveland City Forge
ClimaSpec
Con-Serv Inc.
Controlled Automation, Inc.
CoreBrace
Cutting Edge Steel & Stair
DGS Technical Services, Inc.
Doerken Coatings
Dyson Corp.
Enidine
EVER Seismic
FATZER AG
FICEP Corporation
Fontana Fasteners, Inc.
GEKA USA
GRM Custom Products
Gsource Technologies LLC
Harbor Fab
Haydon Bolts, Inc.
Hercules Bolt Company
HYTORC
IAPMO Uniform Evaluation Service
Infasco
Innovative Transport Solutions (ITS)
ISC
John A. Papalas & Co.
Kobelco Welding of America, Inc.
LS Industries
Messer Cutting Systems
MetFin Shotblast Systems
Mid Atlantic Global
New Millennium
Nexus Steel Detailing, Inc.
Nucor – Corporation
Nucor Skyline
Nucor Vulcraft/Verco Group
Ohio Gratings, Inc.
Pacific Stair Corporation
SCHULLER&Company
Seismic Bracing Company
Serviacero USA
SidePlate / MiTek
Simpson Strong-Tie Co.
Steel Deck Institute
Steel Joist Institute
Steel Tube Institute
Trilogy Machinery, Inc.
TRU-FIT PRODUCTS
Vectis Automation
Viking Wheel Blast Systems
Voss Engineering, Inc.
Wrought Washer
Wuxi Zhouxiang Laser Machinery Co., Ltd.
X SERIES USA

27 Welding and Stud Material

AA Anchor Bolt, Inc.
AGT Robotics
AKYAPAK USA
American Welding Society
Atlas Tube
Badger Products
Cerbaco Ltd.
CWB Group
Haydon Bolts, Inc.
Hercules Bolt Company
ISC
Lincoln Electric
Miller Electric Mfg. LLC
Red Cedar Steel
TRU-FIT PRODUCTS
Vectis Automation
Voortman Steel Machinery

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