

Modern Steel Construction

April 2023

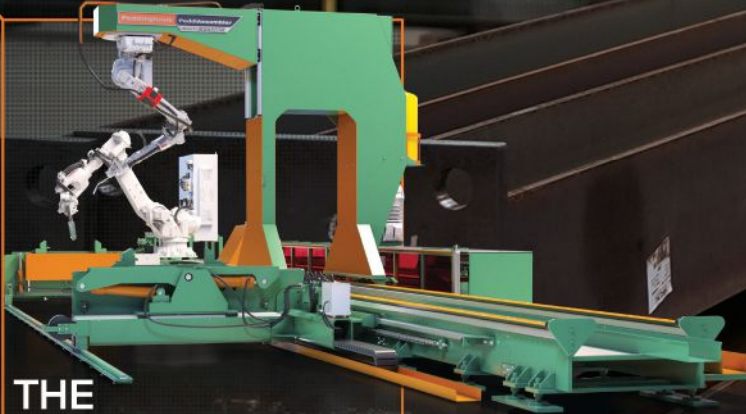


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**EXHIBITOR LIST
INSIDE!**

PEDDIASSEMBLER VS MANUAL

TRIPLE PASS WELD 6.6 TONS OF STEEL



THE
PEDDIASSEMBLER

**5 HOURS
59 MINUTES**

- 111 TACKS
- 215 WELDS
- 45 PARTS
- 31 ROTATIONS
- 0 ERRORS



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- 35 ROTATIONS

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editor's note



OK, OK, so maybe I had a little help from a ladder.

The hoop is adjustable, and when I first bought and assembled it (in the early days of COVID), I set it to 9 ft high so that my son would have an easier time making baskets (wouldn't you know it, so did I). Now that he's gotten taller (I haven't), I recently put it up to its full height, which means he'll need to adjust his shot a bit and use his legs more. And the good news is that 10 ft is as high as it goes, but he can always get better at shooting baskets with practice, proper guidance/coaching, and self-motivation. (And in sticking with the basketball theme, if you want to read about one prominent fabricator's experience working on a unique college basketball venue, check out the Field Notes article "Conveying Cambering Considerations" on page 22.)

Similarly, good engineers push themselves to design more efficiently, come up with new ideas, take on new and more challenging projects, and find ways to get their structures to come together faster. Fabricators and others in the steel industry do the same. And while experience and practice are paramount to improvement in any area, there's plenty to be learned from experts—and ever-improving technology and equipment don't hurt either.

NASCC: The Steel Conference is just a couple of weeks away, taking place April 12–14 in Charlotte, and brings together 200 sessions led by industry experts to help you become better at your role in the steel design and construction industry. It also boasts an exhibit hall of nearly 300 vendors showcasing technology, equipment, heavy machinery, and services designed to create speed and improvements at every link in the supply chain. (You can view the entire list starting on page 57.) Topics range from keeping an eye out for unevenly loaded

In honor of the recent completion of March Madness (it's one of my favorite times of the year), here's a photo of me with a basketball hoop. (I had to jump really high to get it.)

welding connections to new applications in steel bridge redundancy to additive manufacturing for steel to best practices for designing and detailing with steel joists to implementing strategies for developing a tech-savvy and collaborative workforce. And that's just the tip of the iceberg! (And if you want to preview some sessions, every 2023 issue so far—including this one—includes a handful of preview articles.)

You can learn more and register at aisc.org/nascc. One low cost gets you access to the sessions, the keynote addresses, and the exhibit hall, not to mention plenty of networking opportunities.

If you're not able to make it to Charlotte, fear not! For \$225 (\$350 for nonmembers) each for the first and second registrants from your firm (and \$20 for each additional registrant—\$30 for nonmembers), you can live-stream select sessions. All NASCC Online sessions are included in your registration, so you don't need to register for individual sessions. You can view a list of the streaming sessions and register at aisc.org/nascc-online.

And if you are planning to attend in person, be sure to download the mobile show app and navigate the conference like a pro. Search the App Store or Google Play for "NASCC," visit aisc.org/nasccapp, or scan the QR code.



Whether you attend online or in person, you will learn lessons, advice, and perspectives that will help increase your shooting percentage, er, set you on the path to becoming better at your role on the steel design and construction team.


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Chief Editor

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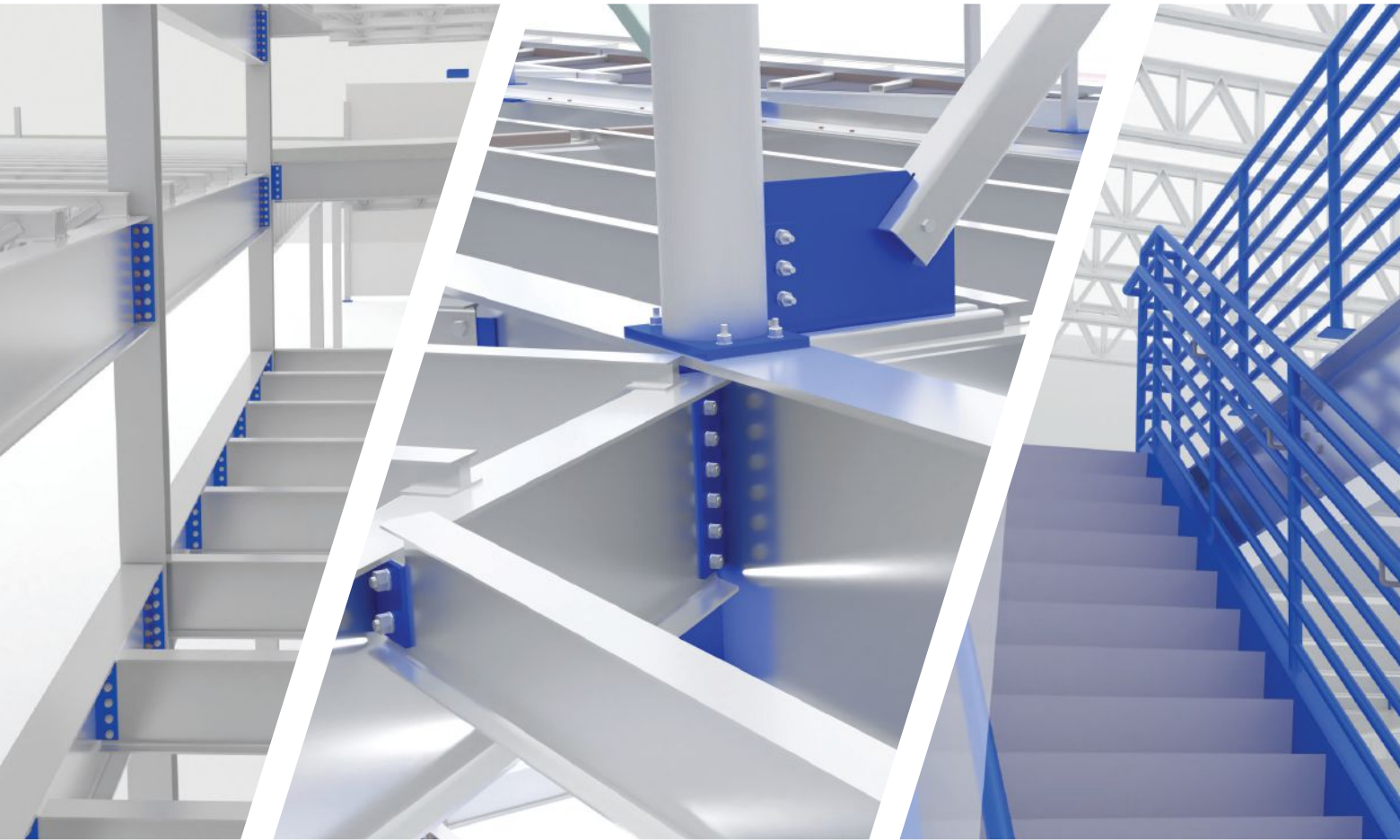
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steel interchange

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.

Fabrication and Erection Tolerances for AESS Category 2

What are the fabrication and erection tolerances for members designated as architecturally exposed structural steel (AESS) Category 2?

AESS is addressed in Chapter 10 of the 2022 AISC *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303). Fabrication tolerances are listed in Section 10.4: Fabrication—specifically, in Sections 10.4.2, 10.4.4, and 10.4.5. Also, Table 10.1 ID 2.2 states that for AESS Category 2, "The fabricated product shall have one-half the applicable ASTM or AWS straightness tolerance," referencing Sections 10.4.3(b) and 10.4.5.

Section 10.6: Erection lists all the requirements for erecting AESS material. The erection tolerances for AESS material are no more restrictive than those required for structural steel. If the contract documents do not list more restrictive tolerances for the erection of AESS material, then the erection tolerances are only required to meet those listed in Section 11.3: Erection Tolerances.

In addition, Section 10.2(b) requires that the contract documents list any fabrication and/or erection tolerances more restrictive than those listed in Section 10. And if you're looking for a brief summary of the various AESS categories and their requirements, check out "Maximum Exposure" in the November 2017 issue of *Modern Steel Construction*. You can also find plenty of AESS information at aisc.org/aess.

Larry Kruth, PE

Counterfeit Bolts?

We have come across some heavy hex nuts paired with Grade A325 bolts that do not have a D or a DH marking. Instead, they have some other letters and three arcs. We are worried that they may be counterfeit. Should these nuts be replaced?

You should speak with the fabricator or erector if you have questions about any of the structural steel materials used on a project. Section 2.3 of the 2020 *RCSC Specification for Structural Joints Using High-Strength Bolts* addresses heavy hex nuts and states: "Heavy hex nuts shall meet the requirements of ASTM A563, except as noted in 2.3.2. The grade of such nuts shall be as given in Table 2.2. When coated to the standards listed in Section 2.8, nuts shall be over-tapped in accordance with Table A1.2 of ASTM F3125."

Figure 1 (Commentary Figure C-2.1 in the *RCSC Specification*) provides markings for acceptable heavy hex nuts.

For Grades D and DH, you would see these marked on the nut. You mentioned seeing arcs. I suspect that you are looking at a Grade C ASTM A563 nut. The additional letters likely identify the manufacturer. The U.S. Patent and Trademark Office (USPTO) maintains a database of registered fastener insignias that might help you identify the manufacturer associated with the marking (here's a recent list, though be sure to check the site for any updates: tinyurl.com/fqauspto). Some departments of transportation also have their own fastener identification guides (e.g., here's the list from the Illinois Department of Transportation: tinyurl.com/illfastguide).

Table 2.2 in the *RCSC Specification* lists the permitted ASTM A563 Nut Grades. For Grade A325 bolts, Grades C, D, and DH nuts are all permitted.






ASTM A563 nut	 Arcs indicate Grade C	 Arcs with "3" indicate Grade C3
	 Grade D	
	 Grade DH	 Grade DH3

Fig. 1. Required marks for acceptable bolt and nut components (see the 2020 *RCSC Specification* for the complete figure).

Carlo Lini, PE

Incorporating Sustainability in Design

Does AISC have any guidelines on incorporating sustainability in design?

AISC has several resources on sustainability and structural steel, many of which can be found at aisc.org/sustainability. A few examples include:

Minimizing environmental impact, maximizing efficiency. AISC has an excellent white paper titled *More than Recycled Content: The Sustainable Characteristics of Structural Steel*. At the end of the paper, there is a thoughtful list of strategies for minimizing

the environmental impacts of structural steel, categorized into the topics listed below.

- early involvement between the structural steel fabricator and the project design team
- designing to maximize the characteristics of steel
- specifying the use of domestic steel
- specifying higher-strength material
- coordinating with the fabricator and local steel service centers to determine the most common shapes
- using used material
- minimizing material quantities

The paper ends with the following statement, which is worth noting: “But the best resource to minimize the environmental impacts for structural steel projects is a local structural steel fabricator who can discuss the optimization of the structural framing system. A list of structural steel fabricators, searchable by location, can be found at aisc.org/fabricator.”

Another good resource for tips on efficient framing is the November 2012 SteelWise article “Does This Beam Make My Building Look Too Heavy?”

AISC Design Guide 37: Hybrid Steel Frames with Wood Floors. Another great option for sustainable framing is the use of a hybrid steel structure and mass-timber floor system. Modern hybrid steel and mass-timber systems use the strengths of both materials to achieve highly efficient and attractive structural systems. This newly published Design Guide provides a multi-disciplinary review of the design considerations that impact the structural design of hybrid steel-framed structures with mass-timber floors, including fire, acoustics, and sustainability. And as a matter of fact, it’s the topic of this month’s SteelWise article, “Teaming Up,” on page 16.

SE 2050 Recommendations. SE 2050 stands for the Structural Engineers 2050 Commitment Program, which is a comprehensive program designed to ensure substantive embodied carbon reductions in the design and construction of structural systems by the collective structural engineering profession—and it’s endorsed by AISC. Check out its guidance at <https://se2050.org>.

Key points on the sustainability of structural steel. Structural steel is the most recycled material in the world, and domestic structural steel contains 93% recycled waste, on average, and is 100% recyclable into new materials over and over again, with 70 million tons recycled each year.

In addition, steel produced in the U.S. has the lowest carbon emission intensity among the top seven steel-producing countries worldwide.

And net-zero steel is already available through a combination of mills purchasing renewable energy and carbon offsets. Furthermore, switching to 100% renewable energy will reduce steel’s carbon footprint by 41%.

Modern Steel Construction. Numerous articles related to sustainable design in steel have been published in *Modern Steel*, and you can search our Archives for sustainability-related articles.

Want more information on sustainability? Contact Max Puchtel, AISC’s director of government relations and sustainability, at puchtel@aisc.org.

Yasmin Chaudry, PE

Material Identification and Piece Marking

Should assembly marks of identical pieces be the same, or is it okay for them to vary? A steel detailer we’re working with is currently showing four identical L4×4×1/4 angles and four L5×5×5/16 angles with different marks for each piece.

AISC’s *Detailing for Steel Construction* (aisc.org/publications under “Detailing Resources”) states, “If identical assembly pieces appear on several shop drawings, their marks should be carried forward from the first drawing on which they appear. This saves shop costs by eliminating template work. As more than one method of carrying assembly marks forward exists, the steel detailer should follow the preference of the employing fabricator.”

Bill of Materials by Sequence						
Job # 1847						
Property of ABC Fabricators						
Mark	QTY		Type & Size	Grade	Length	Weight
C42A	1	W	14x22	A992	30'-0"	660.00#
A290A	1	L	4x4x1/4	A572-50	8'-0"	52.80#
A290B	1	L	4x4x1/4	A572-50	8'-0"	52.80#
A290C	1	L	5x5x5/16	A572-50	8'-6"	87.55#
A290D	1	L	5x5x5/16	A572-50	8'-6"	87.55#
A290E	1	L	4x4x1/4	A572-50	8'-0"	52.80#
A290F	1	L	4x4x1/4	A572-50	8'-0"	52.80#
A290G	1	L	5x5x5/16	A572-50	8'-6"	87.55#
A290H	1	L	5x5x5/16	A572-50	8'-6"	87.55#

Since more than one method of carrying assembly marks forward exists, the fabricator should convey their preference to the detailer through a fabricator’s detailing standards document.

Larry Muir, PE



Carlo Lini (lini@aisc.org) is director and **Yasmin Chaudhry** (chaudhry@aisc.org) is staff engineer in the AISC Steel Solutions Center. **Larry Kruth** recently retired from AISC’s as vice president of engineering and research. **Larry Muir** is a consultant to AISC.

Steel Interchange is a forum to exchange useful and practical professional ideas and information on all phases of steel building and bridge construction. Contact Steel Interchange with questions or responses via AISC’s Steel Solutions Center: 866.ASK.AISC | solutions@aisc.org

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

The complete collection of Steel Interchange questions and answers is available online at www.modernsteel.com.



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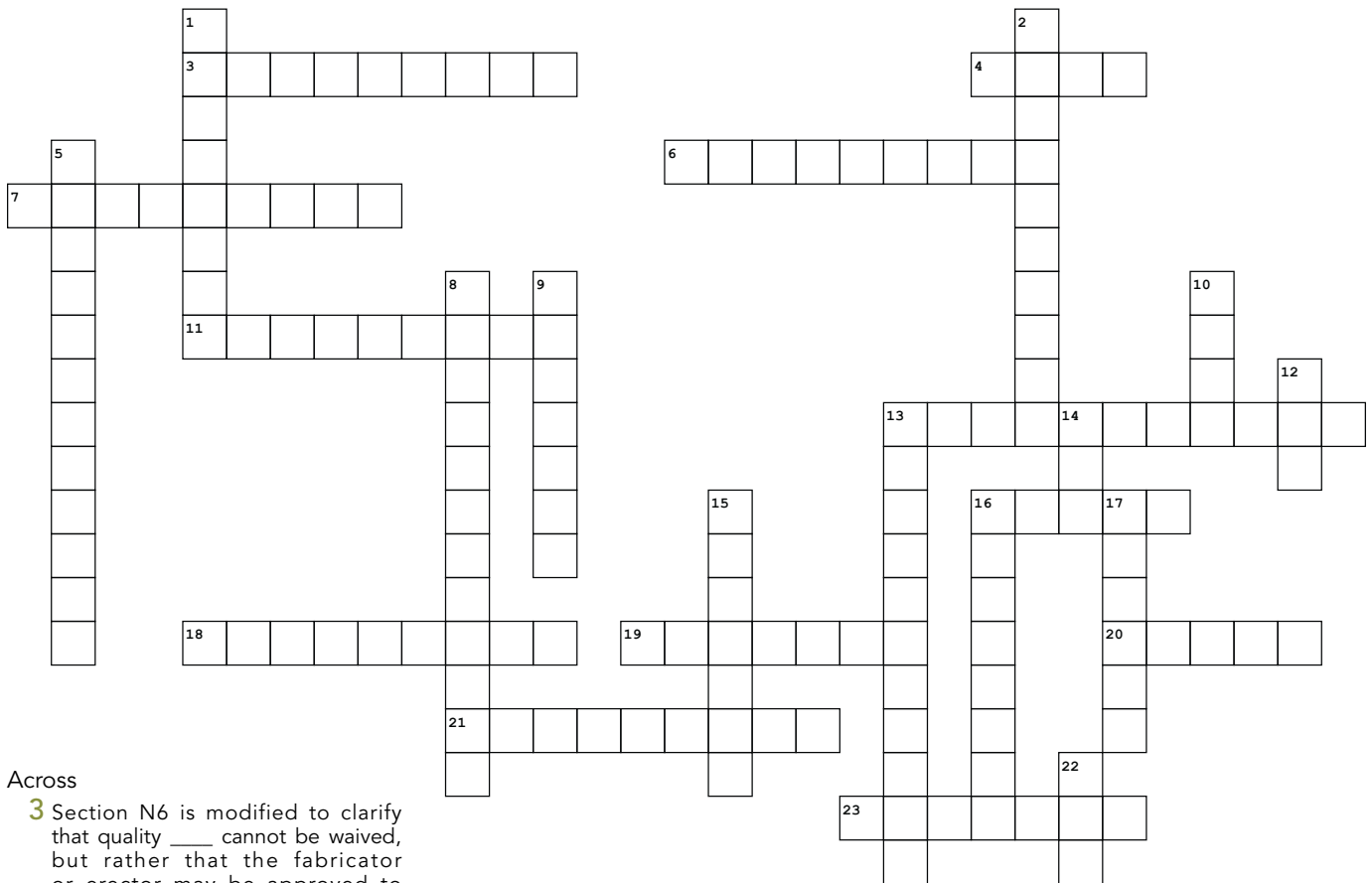
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steel quiz

Following the release of the 2022 AISC *Specification for Structural Steel Buildings* (ANSI/AISC 360-22), this special Steel Quiz is designed to test your knowledge of the *Specification* and some of the significant changes in this new version. Need some clues? Download your free copy of the 2022 *Specification* at aisc.org/2022spec.



Across

- 3 Section N6 is modified to clarify that quality ____ cannot be waived, but rather that the fabricator or erector may be approved to perform inspections in lieu of an independent, third-party quality assurance inspector.
- 4 Color of the *Specification* cover
- 6 Chapter I now includes reinforcing requirements for filled and encased ____ members, which had previously been included by reference from ACI 318
- 7 The term “drawings” has been updated to ____
- 11 Name for composite plate shear walls—concrete filled, which are now covered in Chapter I
- 13 Provisions for the design of compression members with lateral bracing offset from the shear center, also known as ____-axis torsional buckling, moved from the Commentary to Section E4
- 16 Q_f , which is the ____-stress interaction parameter, is revised in Section K1.3
- 18 A more accurate ____ width is provided in Chapter K to calculate available “punching” shear strength
- 19 Appendix 3 clarifies hole-forming provisions for elements subject to this
- 20 The approximate method for inelastic moment distribution (often referred to as the 9/10ths rule) is relocated to this Appendix

- 21 Name of a new Section A5, which was added to specifically address the review and approval of approval documents
- 23 The design for this is removed from Appendix 2 and replaced with updated guidance in Section B3.10

Down

- 1 The *Specification* is dedicated to (last name)
- 2 A new Section B8 is added to clarify that the provisions of the *Specification* are based on specific ____ provided in the *AISC Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303)
- 5 The *Specification* now clarifies the difference between structural design documents issued for ____ and structural design documents issued for any purpose
- 8 For welds with force applied at an angle to the weld’s ____ axis, Section J2.4 is updated to clarify when the directional strength increase is permitted
- 9 Shear lag factors in Table D3.1 are updated for connections to HSS members loaded in ____
- 10 The *Specification* is developed using ____ consensus procedures
- 12 An alternative bolt tensile strength based on the ____ tensile area of bolts is added in Table J3.2
- 13 Appendix 4 includes new equations for calculating this strength for several types of composite members
- 14 Provisions for the design of filled composite members with high-strength materials are added to this Appendix
- 15 Section J2 provides revised requirements to qualify ____-joint-penetration groove welds with effective throats larger than those prescribed in AWS D1.1
- 16 Equation H3-6, used to address ____ forces, has been updated
- 17 Provisions for calculating the strength of these historic fasteners are added in Appendix 5
- 22 Tension field action is now applicable to ____ web panels in addition to interior web panels of built-up members with transverse stiffeners

TURN TO PAGE 14 FOR ANSWERS

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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.

Across

- 3 Assurance
- 4 Gold
- 6 Composite
- 7 Documents
- 11 SpeedCore
- 13 Constrained
- 16 Chord
- 18 Effective
- 19 Fatigue
- 20 Eight
- 21 Approvals
- 23 Ponding

Down

- 1 Galambos
- 2 Tolerances
- 5 Construction
- 8 Longitudinal
- 9 Tension
- 10 ANSI
- 12 Net
- 13 Compression
- 14 Two
- 15 Partial
- 16 Combined
- 17 Rivets
- 22 End



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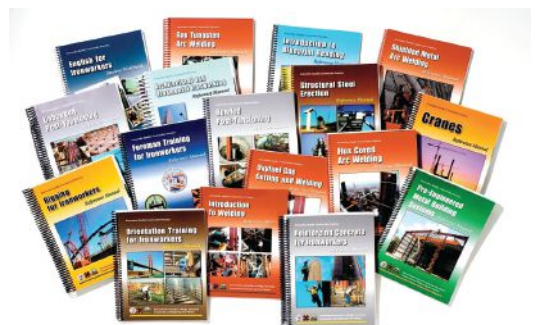
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HOW IS IT DONE?

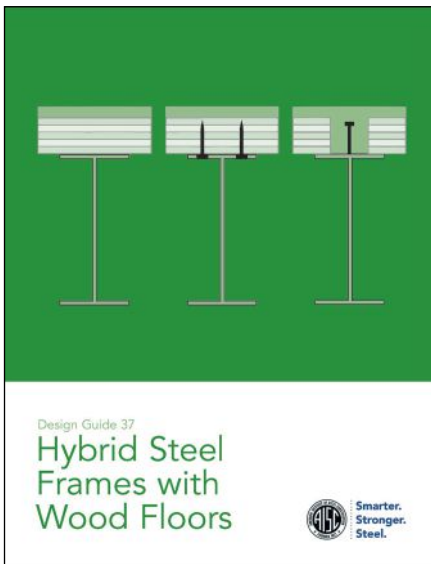
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Teaming Up

BY MICHELLE ROELOFS, PE

A new AISC Design Guide provides a roadmap for designing hybrid steel and wood systems and getting the best out of both materials.



THE RECENT DEVELOPMENT of a new building system incorporating panelized mass timber flooring combined with structural steel has created an exciting new structure type.

Up until now, however, there has been little to no guidance on best practices for designing steel framing systems with wood flooring. But with the recent publication of AISC Design Guide 37: *Hybrid Steel Frames with Wood Floors*, designers considering hybrid steel and timber structures now have a valuable resource. Authored by a multidisciplinary team at global sustainable development consultancy Arup, this new Design Guide provides a comprehensive context for this structure type, including considerations for connections between the two material types, fire and acoustic considerations, and sustainability.

It is specifically focused on accelerating the use of hybrid timber and steel framing systems in multistory residential and commercial construction. Following is a brief glance at the new guide's organization:

Chapter 1 provides an introduction to mass timber, highlighting the different types of mass timber products that are available in the United States. The design guide focuses primarily on the use of cross-laminated timber (CLT) panels as a floor system, but many of the principles also apply to other mass timber floor panel systems, including dowel-laminated timber (DLT), nail-laminated timber (NLT), mass plywood panel (MPP), and glued-laminated timber panels (GLT). This section also discusses the relevant codes applicable to mass timber construction.

Chapter 2 introduces hybrid steel-timber systems and details their many benefits, including aesthetics, sustainability, long spans, reduced column sizes, prefabrication, and improved vibration performance. The basic hybrid system covered in this guide consists of a three-ply or five-ply CLT slab spanning between secondary steel beams with steel columns and a steel lateral system. The basic system can be applied to specific program requirements, and spans, beam depths, and CLT thickness will be dependent on the building program, design loads, fire rating, and serviceability requirements. An example floor plate for an office program is included, and this chapter also highlights three prominent U.S. case studies of buildings implementing the hybrid approach.

Chapter 3 covers fire design and code considerations for hybrid structures. Timber is a combustible material, so building construction types are limited to those that allow combustible structural systems, such as Types III, IV-HT, and V. The 2021 *International Building Code (IBC)* has introduced three new construction types that are appropriate for hybrid construction and allow for taller structures than previously allowed in earlier versions of the *IBC*. In many cases, a fire rating of the primary structure will be required, and the steel and mass timber assemblies will need to consider appropriate fire protection options to achieve the required fire-resistance rating. Mass timber floor panels can provide this rating either by encapsulation or designing the slab to accommodate a loss of thickness due to charring in a fire event. Steel can achieve the required rating by using sprayed fire-resistant materials (SFRM), noncombustible fire-resistive board, or intumescent paints. The interface between the materials also needs to be considered carefully.

Chapter 4 discusses the basics of acoustics in mass timber buildings. Key to the performance of the hybrid system is the acoustic separation that can be provided by the floor panel. Bare CLT panels are unlikely to achieve acceptable acoustic performance for most program uses, and strategies for improving their acoustic performance include adding mass, adding an air space, or adding resilience. One common solution is a mass topping (e.g., gypcrete or concrete screed) on top of a resilient underlayment

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Hybrid steel and wood framing systems bring the best of both worlds when it comes to sustainability.

The building industry produces 50% of the globe's greenhouse gas emissions. Operational energy accounts for 30% of this, while building materials and material production add another 20%. In order to reduce global greenhouse gas emissions, the building industry must explore methods for reducing the embodied carbon impact of building structures. New building systems that can optimize efficiency and minimize the use of high-carbon materials will be an important contribution to the reduction of global greenhouse gas emissions—which is why hybrid steel and wood framing is a great option.

Domestically produced structural steel is highly recyclable and, on average, comprises 93% recycled steel scrap. At the end of its life, nearly 100% of all structural steel is turned back into new steel products and can be recycled with no loss of its physical properties. In addition to the sustainability benefits, steel has a proven track record of being used in hybrid and composite construction types that optimize its material efficiency. And its low weight (and high strength-to-weight ratio) can help reduce foundation loads.

Timber can be sustainably harvested and produced into building materials that have a low embodied carbon impact. Timber has long been a common building material in the U.S., though most timber construction has been limited to small-scale residential applications. Mass timber is distinct from light-frame timber in that the products are typically engineered, panelized, and maintain minimum thickness to achieve improved fire performance.

Combined as a steel skeleton with wood flooring, you have a structure that boasts sustainability benefits across the board!



on top of a five-ply CLT slab. In addition, this chapter summarizes achievable sound transmission class (STC) and impact insulation class (IIC) ratings for various build-ups based on test data.

Chapter 5 goes into detail about the sustainability opportunities provided by hybrid steel and timber structures. Embodied carbon is calculated using a life-cycle assessment (LCA), and the guide reviews the standards and norms for LCAs and presents a study comparing hybrid timber-steel construction with a conventional post-tensioned concrete framing system and also with steel framing using slab-on-metal-deck flooring. The comparison uses two different commercially available LCA tools and discusses the discrepancies that occur due to differing assumptions and inputs into the analysis.

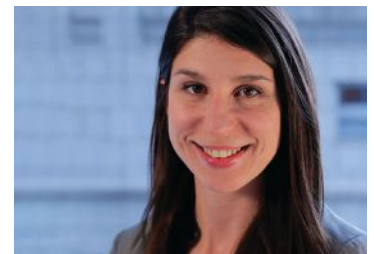
Chapter 6 covers structural design considerations, focusing on the design of mass timber panels and their connections and interaction with the steel frame structure; this includes gravity design, lateral design, vibration, and detailing considerations. Multiple design examples are included in this chapter, including timber panels, diaphragms, composite hybrid steel beams, and fire-resistance ratings.

Chapter 7 highlights constructability issues, with a special emphasis on designing

the diaphragm in hybrid structures. Several diaphragm strategies have been used in the past, but the recommended solution in most cases is to use CLT as the diaphragm that is transferring loads to the steel lateral system. Where the diaphragm loads exceed the capacity of the CLT panel, supplementary steel in-plane bracing can be provided.

Hybrid steel frames with wood floors present an attractive and efficient building typology that can help reduce embodied carbon while achieving architectural and programmatic project requirements. And Design Guide 37 is an important roadmap for designers to use in implementing this framing solution on future projects. ■

You can download Design Guide 37, as well as all of AISC's Design Guides, at aisc.org/dg.



Michelle Roelofs is an associate principal with Arup's New York office and is one of the authors of Design Guide 37.

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Moving the Conversation— and the Industry—Forward

BY BRIAN RAFF

AISC’s new set of “one-pagers” is geared toward helping steel industry professionals start conversations that result in more steel projects being built.


THE FUTURE IS always uncertain, but one thing remains constant: There is never a shortage of quotes about the future, and this one speaks to me.

“The future is not something to predict. The future is something to build.”


This quote, attributed to Franco Ongaro, former director of technology for the European Space Agency, urges us to take action, not merely sit around and wait. And that’s just what we’re working toward at AISC.

To build our own future, AISC has launched a national engagement program to provide AISC members with a toolkit to help educate the marketplace on the benefits of steel. One of the first tools to come out of this program is a set of free pro-steel messaging documents—focusing on talking points related to efficiency, resiliency, value, speed, sustainability, and more—that set the stage for steel to win in the marketplace.


These “one-pagers” are meant to be conversation starters for all of our industry partners. AISC employs 13 structural steel building specialists and four steel bridge specialists around the country—but our industry at large is a well-oiled machine of thousands of professionals, all reliant on the success of the steel industry. These include our full, associate, and affiliate member companies (see Figure 1) and their various team members (not to




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Fig. 1.
AISC Full, Associate, and Affiliate Members

Member Type	Number	Commentary
Full	994	Fabricator, steel mills, HSS producers, and service centers with production facilities or warehouses in the U.S.
Associate	504	Allied companies (equipment manufacturers, bolting manufacturers, welding equipment, coating manufacturers, etc.) and service providers (erectors, detailers, industry recruiters, etc.)
Affiliate	662	General contractors/construction managers, building inspectors, and code officials

mention the thousands of designers that design with steel). And with these messaging documents, our hope is to turn these industry players into thousands of structural steel specialists as well so that they can help us amplify steel's winning message—and we want to ensure that we're all reading from the same playbook. You can download these steel one-pagers at aisc.org/one-pagers.

As we've settled into 2023, now is a great time to reach out to your building or bridge steel specialist (at aisc.org/steelspecialists and aisc.org/bridgespecialists) to learn more about our membership engagement program and the tools we have available to you—and how you, too, can become a more effective advocate for steel! ■



Brian Raff (raff@aisc.org) is AISC's vice president of market development, marketing communications, and government relations.

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Conveying Cambering Considerations

INTERVIEW BY GEOFF WEISENBERGER

An expert on steel design, fabrication, and erection with a half-century-plus of experience, former LeJeune Steel president Larry Kloiber shares his thoughts on his life in the industry, particularly his work with cambering steel.



LARRY KLOIBER started his steel career as a regional engineer with AISC before embarking on a nearly 50-year stint with one of its member fabricators, LeJeune Steel in Minneapolis, where he eventually became president and CEO.

Over that span, he developed expertise in cambering steel and is one of the authors (along with Susan Burmeister) of AISC Design Guide 36: *Design Considerations for Camber* (which you can access at aisc.org/dg). At last year's NASCC: The

Steel Conference, he was recognized with an AISC Special Achievement Award for his contributions to the advancement of steel—and also received an AISC Lifetime Achievement Award in 2002 and the T.R. Higgins Lectureship Award in 2004. (Speaking of the Steel Conference, you can learn more about this year's show—taking place April 12–14 in Charlotte—and register at aisc.org/nascc. You can also read about this year's AISC award winners in the February News section at www.modernsteel.com.)

Here, Larry discusses his history in the steel industry, the evolution of cambering, one of his favorite projects from his fabrication days, and more.

How many Steel Conferences have you been to over the years?

I first attended in Boston when it was solely an Engineering Conference. That would have been about 1966, and I think I've only missed one or two since then.

That's impressive! Were there any that stood out in particular for you, or do they all kind of bleed together at this point?

I have found something of value at every conference. When it was just an Engineering Conference, it was smaller and consisted of design and fabrication sessions. There was more networking among designers and fabrication engineers, and it didn't have an exhibit hall with all the equipment and other booths. There were also Operating Conferences, and because I was also responsible for fabrication management, I started going to both. The Operating Conferences tended to be a little more fun. When the first NASCC was organized, the event snowballed and grew so much. It is incredible to see all the exhibitors in Denver. The interest in the new steel technology is really mind-blowing, and I think people are pretty excited just to be back in person again.

Definitely! Can you tell me how you got into the steel fabrication business?



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.

I started working for AISC as a regional engineer in Minneapolis, and my introduction to the steel industry was at an international conference at Lehigh University on plastic design of structural steel for high-rise buildings. Leading designers, educators, and fabricators from all over the world attended. After watching full-scale tests of plastic-designed frames along with a test of the first composite beam I ever saw, I became sold on steel as the way to go. I spent about three years with AISC, and then I started looking at where I wanted to be in the long term. I had other opportunities that would have kept me at AISC, but I decided that I wanted to try fabrication, which would allow me to stay in Minneapolis. That was LeJeune Steel, and I spent almost 50 years with them. And I still serve them in a consulting role.

That's quite an accomplishment! Over that time period, could you point to one or two projects that stand out for you?

Carver-Hawkeye Arena in Iowa City used a Takenaka-type skewed chord truss space frame. All the diagonals and top chords were exposed round A588 HSS that used slotted plate connections to accommodate the skewed geometry. The use of HSS instead of pipe was a value engineering savings that we split with the owner. Every time I watch an Iowa basketball game, I'm reminded of the project. We were also involved in several interesting high-rise buildings, like a 52-story tower in Minneapolis that had some unique structural elements, such as a Vierendeel truss wall system combined with special girder framing to form the lateral load system. These were buildings involving contractors that I enjoyed working with and who appreciated our work and treated us as team members. We had good relationships with them, and I like to think we helped make the projects successful.

That's good to hear. I have to say, Carver-Hawkeye Arena is my favorite basketball stadium because I went to school at the University of Iowa.

The University of Iowa treated us very fairly. There were site conditions that were very difficult for the erector, but we worked through the problems. As a follow-up to that, they invited me back for an Iowa-Minnesota basketball game. The Gophers won on a last-second long three-point shot.

My host at Iowa told me, "We wanted you to have a good time, but we didn't want your team to win the game!"

That's great. To those who don't know, the arena is built into a hill, and the seating is underground. You enter the building at street level, the concourse is at the top, and the seating is basically a sunken bowl. But the roof framing is exposed on the inside and outside of the building. I've never seen anything quite like it.

Yes, the entirety of the upper space truss is exposed, and there's a series of heavy wide-flange sections that serve as bottom chords that support the roof beams. The Takenaka truss is a concept where, because of the skewed chords, the bottom chord span is much larger than the upper compression chord, so it makes a more efficient design. Everything above the roof was weathering steel. That presented some concerns because there were some questions about how tight the connections had to be so that rust couldn't grow in the joints and damage the bolts. We found that when we thermally cut the slots in the round HSS, the residual stress caused slots to open up. I tried to figure out how to prevent this. I went out to the shop to study the problem and found that one of our fitters had already solved the problem by using a tapered template to compensate for the distortion. It was a whole team effort where you have multiple people coming at problems from different angles to solve them.

It sounds like a great experience. Switching gears, I want to talk about camber for a bit. I think most people listening have a basic understanding of camber. But as someone who is an expert in it—and wrote the Design Guide on it—are there any "secrets" to it per se or other considerations that maybe aren't obvious?

The designer needs to understand the total process from design to concrete placement to do it correctly. The design starts with determining what the real loads are. Because of the way the deck is placed, you don't have uniform loading on all the beams. You won't know exactly what the load will be because it's a beam on an elastic foundation type of problem. There is also the effect of end restraint, which

must be approximated. Using engineering judgement, it's possible to come up with adequate deflection calculations.

Concrete placement is an important part of a level floor when you're doing it on a cambered beam. The contractor must know whether the beams have been cambered for a uniform slab thickness or if the camber is sized to screed to a constant elevation.

The actual physical part of cambering gets relatively simple, particularly now with cambering machines. Back when I first started working with cambering, early presses had a single ram, which resulted in yield at one point. With two rams, you have a uniform yielding between the two, so you get a smoother curve and a more accurate camber. Each beam yields slightly different, so it is important to measure to make sure that the camber you put in there is right.

We found in researching the Design Guide that a properly cambered member does not lose camber in normal handling and shipping. The old way of thinking, when cambering was done at the steel mills, was that a large tolerance was needed to allow for some variation because of the process used. Now, when cambering is done in the fabrication shop, the camber that you get on the job site should be what you measured in the shop. ■

This column was excerpted from my conversation with Larry at last year's NASCC: The Steel Conference in Denver. To hear more from him, including his thoughts on writing a Design Guide and life in Minneapolis, check out the April 2023 Field Notes podcast at modernsteel.com/podcasts. And again, to learn about and register for this year's Steel Conference, visit aisc.org/nascc.



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

School of Hard Knocks

BY CASEY BROWN

The best lessons in good steel construction practices don't come from formal instruction but rather from real-life experience.

BACK BY POPULAR DEMAND, it's "10 Lessons in Steel Construction You Won't Learn in School!"

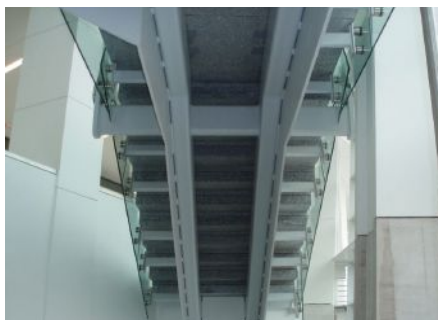
This session was on the docket at the 2022 NASCC: The Steel Conference in Denver, and AISC was kind enough to request an encore performance this year in Charlotte.

So what are the objectives? Simple. I plan to:

1. Provide a better understanding of select aspects of steel construction projects and some common/ingrained lessons learned over decades from a steel project manager's perspective.
2. Help all steel fabrication and construction team members better understand each other's roles and challenges in order to better execute our steel projects.
3. Increase steel construction value/appeal and spread our industry's story (it's by far the best one out there).



A truly collaborative approach can help create a smooth transition from shop to field for complex steel assemblies.



The session is designed for anyone involved in steel construction: designers, administrators, detailers, suppliers, fabricators, erectors, and bender-rollers, to name a few. As a lifelong operations guy (specifically in the roles of project manager and operations manager), most of the lessons I plan to cover came from life on the road and time in the trenches. My company, Zimkor (an AISC member fabricator in Littleton, Colo.), is a fabricator by nature, but we often end up being responsible for detailing to fabrication to installation, so the lessons learned and stories shared span the spectrum of the steel experience. And let's face it, not all of the lessons are pretty, but we don't mind airing some dirty laundry (and honestly, it's probably a bit healthy for us).

I have, perhaps naively, spent and continue to spend untold hours working toward a mythical utopia where contract documents are a complete thing of beauty, contractors are imminently honest/trustworthy with subs and each other, and we always face good/level/competent competition in our markets [pause for laughter]. Farfetched as this all may seem, I am fully committed to the idea that all of us in the steel industry can and should do better in our craft—and that our ultimate competition is with concrete and wood, not each other. My hope is that this session will help us reach that lofty destination someday.

The lessons I'll share, while admittedly comical, serve as teachable moments for all of us. They include thoughts on and experiences related to profitability vs. lowest responsive bidding, accurately reading contracts, the importance of complete designs (and a good detailer), labor vs. material costs, teaching vs. systems training, getting out of the erector's way, and more.

As an example, one lesson involves looking at how the quality of contract documents and collaboration has changed

over the last 30 years. Architectural completeness and structural completeness are two very different things, and incomplete designs can inhibit teams from being as effective as possible. In addition, most of us spend more time detailing a project these days than we do fabricating and erecting it. This isn't an ideal situation, and while technology and new practices are developed to make things "better" than in the past, it doesn't always work that way, and sometimes it's good to go back to the drawing board. At the end of the day, we can make excuses for inefficiencies or we can find ways to do better when it comes to the design, administration, and construction of steel structures.

Hopefully, these topics and the ensuing dialogue can assist you and your organization in enhancing your steel projects and the industry as a whole, such that all of our offices and shops are full of backlog! ■

For more on steel life lessons to incorporate into your workflow, check out the session "10 Lessons in Steel Construction You Won't Learn in School!" at NASCC: The Steel Conference, taking place April 12–14 in Charlotte. You can learn more about the conference and register at aisc.org/nascc.



Casey Brown (cbrown@zimkor.com) is president of Zimkor, an AISC Board Member, and a past president of the Rocky Mountain Steel Construction Association.

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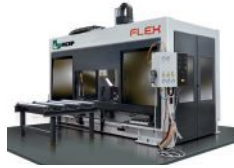
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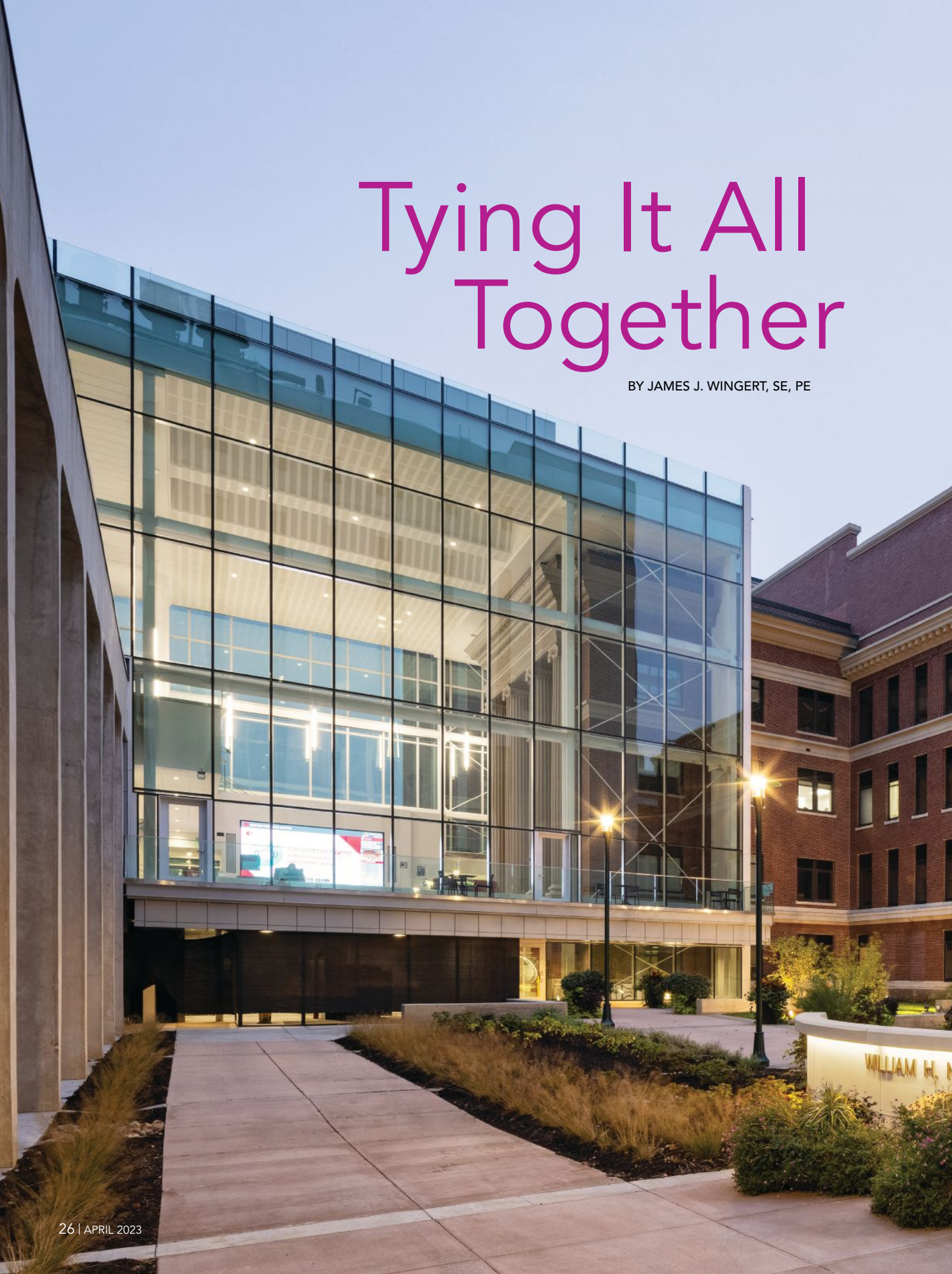
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Tying It All Together

BY JAMES J. WINGERT, SE, PE



An elegant new glass and steel enclosure
fills the gap between two existing buildings
on the University of Nebraska
Medical Center's Omaha campus.



YOU COULD SAY that the University of Nebraska Medical Center's Wigton Heritage Center is a natural fit.

Built between the original hospital tower and Wittson Hall on UNMC's Omaha campus, the new steel-framed building serves as a catalyst for understanding, experiencing, and appreciating UNMC's heritage.

The structure is a 64-ft-wide by 74-ft-long by 64-ft-tall glass and steel enclosure that connects UNMC's past and present, showcasing the iconic columns and historic façade of the original University Hospital on one side and the more modern look of Wittson Hall on the other. The steel structure and glass envelope encapsulate the space between the two existing buildings to create an atrium that provides a space for study, gatherings, lectures, and delegations of visitors to experience the new and exciting developments of UNMC's research with a large video wall. An outdoor balcony provides a quiet area of respite for students, visitors, and employees to experience a sculpture garden to the north. Above the main floor, structural steel was also used to create a link walkway linking the upper-level balcony at Wittson Hall and the original hospital tower. This link serves as a secondary connection between the two campus buildings, allowing students, faculty, and visitors to bypass the main floor when events are taking place.

Narrowing Down Structural Options

The design team, including the project's architect and structural engineer, HDR, considered several structural framing options, including a concrete beam and pan-joint system with lateral load-resisting moment frames, a structural steel composite beam system with moment frames, and a structural steel composite beam system with a tension-only X-bracing. Concrete was ruled out due to the extensive shoring requirements needed to create the atrium roof, which was 64 ft above the floor, leaving

.....

The new Wigton Heritage Center is situated between the original hospital tower and Wittson Hall on UNMC's Omaha campus.

All photos: Dan Schwalm



The new space highlights the iconic columns and historic façade of the original University Hospital on one side and the more modern look of Wittson Hall on the other.

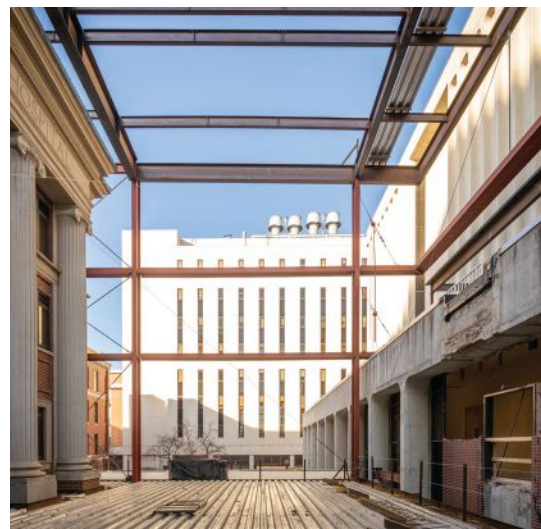
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the two steel options. Both were deemed strong candidates, so the decision largely came down to tonnage. The tension-only X-bracing system was significantly lighter and became the preferred system for the design team. This was especially helpful due to the relatively tall floor-to-floor heights of the existing buildings, which demanded a robust but economical design solution to resist the lateral loads. Not only did the tension rod bracing system create a structurally efficient solution, but it also provided a desirable aesthetic and resulted in savings to the overall budget that could be used on other project features.

When it came to the aesthetics of the tension rod bracing, the architects desired a clean and elegant solution and requested that turnbuckles be avoided. To meet this need, the design team specified a Halfen Detan Rod system, which provided a more refined and elegant look to the space while eliminating turnbuckles.



above and below: The tension-only X-bracing system became the preferred system for the design team.



above and left: The structure is a 64-ft-wide by 74-ft-long by 64-ft-tall glass and steel enclosure that connects UNMC's past and present.



Addressing Obstructions and Site Issues

The site for the project has several utilities and underground tunnels that obstructed a conventional column layout, limiting the number of columns that could be placed on the site. This made it challenging to identify areas where columns and foundations could be located. Thanks to the long-span capabilities of the steel girders, the team was able to move all the columns to the exterior walls and avoid the existing obstructions, which would have been cost-prohibitive to move.

Another challenge was keeping the three structures separated from each other in order to address concerns regarding horizontal movements. The team also needed to consider vertical movements due to snow and live load deflections for the portions of the building that were above the existing original hospital tower and Wittson Hall. The team introduced expansion joints to address the horizontal concerns and designed the structural steel framing to support the exterior wall so that it did not impart any vertical load onto the existing structures.

To eliminate vertical loading, the team essentially used structural steel framing as a backup

frame to the tension-rod bracing. The framing system employs W24 beams, which were rotated and placed as wind girts at select elevations around the exterior walls. This plan not only addressed the loading concerns but also reduced the overall cost of the façade system and maximized the clear views of the outside elements. It also reduced the span of the façade, thereby reducing the mullion sizing. In addition, the girts provided a framework for the expansion joint system to follow.

The steel beams also provided an effective solution for spanning the 74-ft-long roof and resulted in a column-free interior that maximizes usable floor space and creates unobstructed views of the original hospital tower's historical façade. In addition, much of the project abuts existing conditions that were highly variable, so HDR, steel fabricator Katelman, and general contractor Hausmann Construction coordinated the slab conditions such that the transition between the existing and new floors of the two buildings fit together seamlessly. This included implementing block-outs in the slab support uplighting to highlight the façade during evening gala events.



left: The framing system employs W24 beams, which were rotated and placed as wind girts at select elevations around the exterior walls.





above and below: The team coordinated the slab conditions such that the transition between the existing and new floors of the two buildings fit together seamlessly.



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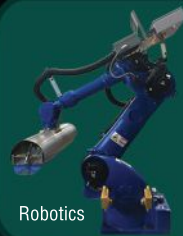


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opposite page: The steel structure and glass envelope encapsulate the area between the two existing buildings to create an atrium that students, faculty, and guests can use for studying, gatherings, and lectures. Steel beams were used to span the 74-ft-long roof, providing a column-free interior that maximizes usable floor space.

The building's roof supports air-handling equipment and features two hollow structural section (HSS)-supported A-frame clerestories that allow natural light to fill the space. Four girders span the length of the roof, connecting the columns together at each end, with steel beams also spanning to the girders to create the openings for the clerestories and support the air-handling unit rails. Additionally, the girders are sloped to facilitate roof drainage, eliminating the need for extensive tapered roof insulation.

Positioned between two existing buildings—and designed to connect them—the Wigton Heritage Center was faced with significant spatial constraints from the get-go. Thanks to the efficient and elegant use of minimalist steel framing, it not only brings these two existing structures together but is also a striking space in its own right, a natural fit that seamlessly transitions between the hospital's past, present, and future. ■

Owner

University of Nebraska Medical Center, Omaha


General Contractor

Hausmann Construction, Omaha

Architect and Structural Engineer

HDR, Inc., Omaha

Steel Fabricator

Katelman Steel Fabrication, Inc. 
Council Bluffs, Iowa



James Wingert

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Remove, Reuse, and Reconstruct

BY KAMLESH KUMAR, SE, PE

Employing the same team for preliminary and final engineering resulted in the most efficient route to rebuilding an Illinois Interstate bridge.

THE COVID-19 PANDEMIC couldn't keep an Illinois Interstate bridge replacement from coming together quickly.

In August 2020, the Illinois Department of Transportation (IDOT) undertook a major reconstruction project for a crucial piece of Champaign-Urbana infrastructure: the Interstate 74 Bridge over the Illinois Central Railroad (ICRR) and Oak St. in Champaign County. And the project opened just over two years later, thanks to a coordinated design and construction effort with one team providing both preliminary and final design services.

I-74 is a major thoroughfare with an average traffic load of over 63,000 vehicles per day. The existing I-74 bridge was 725 ft long and 121 ft, 2 in. wide with two independent superstructures, each 60 ft, 7 in. wide. It accommodated an 11-ft, 6-in. inside shoulder, two 12-ft lanes, one 12-ft auxiliary lane, and a 10-ft outside shoulder in both directions and passed over Oak Street, two Amtrak tracks, and 16 ICRR tracks. The four-span dual superstructures shared common substructures and consisted of a 600-ft-long three-span continuous unit and a 125-ft-long single-span unit with deck joints at both abutments and the easternmost pier (Pier 3). The steel

framing was a mix of original (from 1956) 102-in.-deep built-up steel girders and newer (from 1992) 96-in.-deep welded plate girders connected by cross frames and lateral bracings. The original girders were reinforced with welded cover plates at the midspans and the interior piers. The substructures consisted of three multi-column piers and stub abutments founded on concrete piles and were set at an 18°30' right skew relative to the I-74 alignment.

Evaluation and Coordination

Due to the poor condition of the deck and substantial loss of bearing support at Pier 3, IDOT began exploring options for the crossing's future and selected structural engineer EXP to perform inspection and design services. As part of the preliminary engineering, EXP performed a thorough inspection and concluded that the bridge was in poor condition, owing primarily to the severe deterioration of Pier 3 under the deck expansion joint. There was also a loss of bearing support under a couple of girders, so temporary shoring towers were installed on both sides of the pier to support these girders. A protective shield system was installed under the



Sangamo Construction

deck, and over the railroads, to prevent damage to the tracks from deck spalls. In addition, the inspection also revealed other areas of severe deterioration in the bridge deck, beam ends, deck expansion joints, and bearings.

While evaluating the steel superstructure for reuse, the team determined that performing an analysis focused on fatigue and the remaining service life of the superstructure would be critical. Typically, the ends of the welded cover plates and the lateral gusset plates welded to the girder flanges are the areas that are most susceptible to fatigue, and the analysis, performed per the AASHTO *Manual for Bridge Evaluation*, indicated a remaining service life of fewer than ten years for the existing steel superstructure. Because of the extensive labor cost involved in retrofitting more than 100 cover plate ends and more than 300 gusset plates above the railroad tracks, combined with the need for future inspections and maintenance of these repairs, EXP recommended a complete superstructure replacement.

The team then conducted a feasibility study for jointless bridge superstructures using existing piers and foundations, and a recommendation was made to use Virginia Abutments.

This abutment type places the expansion joint behind an integral back wall to shield the girder ends and bearings from leakages and allows for longer jointless bridges. However, due to the lack of experience and current IDOT policies allowing jointless bridges only up to 610 ft in length, this recommendation was not accepted.

EXP also performed an evaluation of suitable structural corrosion-resistance systems. Four different options—weathering steel, painting, metalizing, and hot-dip galvanizing—were studied for their initial cost, durability, future maintenance needs over the railroad, and desired service life in relation to the remaining life of the reused substructures. Metalizing was chosen over other options for its typical service life of 40 to 50 years, flexibility in spot metalizing or painting as needed, and the fact that it would reduce the number of field splices over the railroad when compared to galvanizing. Special attention was given to locating field splices in the most optimal spots, potentially using construction shoring towers, and properly positioning cranes to minimize the disruption to railroad operations.

During the preliminary engineering phase, the EXP team also studied the impacts of the proposed reconstruction scope on the

The span lengths from west to east are 184 ft, 3 in. (Span 1), 225 ft, 6 in. (Span 2), 185 ft (Span 3), and 124 ft, 9 in. (Span 4) and were kept in the same configuration as the existing bridge to maintain the centerline of the bearings at the substructures. The new girders have an 80-in.-deep web and 21-in.-wide flanges with variable thicknesses.



Bridge Stats

Total structure length:	725 ft
Span lengths:	184 ft, 3 in., 225 ft, 6 in., 185 ft, and 124 ft, 9 in.
Width:	120 ft, 10 in (combined)
Total steel tonnage:	2,300 tons
Coating/ protection system:	Metalizing

railroad operations and the yard and communicated them to IDOT to facilitate construction coordination with ICRR. A clear understanding of the constraints within the railyard and Amtrak train operations helped all parties to develop a reasonable construction schedule, sequence of work, and estimated construction cost. Proactive coordination also helped expedite approvals of preliminary engineering studies and final construction documents.

The final proposed plan included replacing the steel superstructure in its entirety, reconstructing abutment back walls and Pier 3 (above the existing pile cap), and retrofitting the caps for Piers 1 and 2. This latter activity was performed to increase the flexural and shear capacities for respaced girders and relocated new bearings. The abutment back walls were removed down to the top of the existing pile cap and replaced with thicker back walls that were positioned further back to better accommodate the new modular expansion joints at each end. The existing pile capacities were evaluated and deemed adequate for reuse for the increased vertical and lateral loads. In addition, the existing parallel-to-roadway wing walls were partially removed at the abutment interface to accommodate backwall reconstruction.

The New Bridge

The new four-span bridge consists of continuous welded Grade 50 steel plate girders made composite with the reinforced concrete deck for their full length. The two superstructures were kept independent, similar to the existing ones, with a 1-in. preformed joint seal in the median parapets separating the two decks. The overall bridge length is 725 ft, and the out-to-out combined width is 120 ft, 10 in., with individual deck widths of 60 ft, 4.5 in. The span lengths from west to east are 184 ft, 3 in. (Span 1), 225 ft, 6 in. (Span 2), 185 ft (Span 3),



Technology minimized disruptions caused by the pandemic. The use of audio/video communications, advanced planning and scheduling, and an established backup plan ensured that construction did not stop. For example, trucks needed to be scheduled three to four weeks in advance compared to three to four days pre-pandemic.

and 124 ft, 9 in. (Span 4) and were kept in the same configuration as the existing bridge to maintain the centerline of bearings at the substructures. The new girders have an 80-in.-deep web and 21-in.-wide flanges with thicknesses ranging from $\frac{7}{8}$ in. to $2\frac{1}{4}$ in.

Discontinuity in the existing superstructure at the deck expansion joint over Pier 3 was eliminated by making the new plate girders continuous. This meant that Pier 2, which provided fixity only to the first three spans of the existing structure, now needed to provide fixity for the full length of the new bridge, an increase of 20% in the tributary length. Pier 2 elements, such as the pier cap, columns, pile cap, and pile foundations, were checked for increased longitudinal force effects from live, wind, braking, and thermal forces and were found to be adequate.

In addition, the old rocker bearings were replaced with modern high-load multi-rotational bearings to provide for increased load reactions and thermal movements. Large thermal movements at the abutments required the use of modular expansion joints. For added safety and enhanced driving conditions on the bridge deck, a high-friction surface treatment (HFST) was applied to the top surfaces of the decks and approach slabs. HFST is a specially engineered bridge overlay that has a rougher texture and greater surface area for additional friction that reduces crashes on high-speed roadways, especially during inclement weather.

Building in Uncertain Times

In the early phases of the construction (in 2020), the COVID-19 pandemic added some uncertainty and difficulty in terms of material procurement and construction activities, as steel fabrication and delivery had to be completed during the peak of the pandemic.

The regional rail master for Amtrak and the railyard master for ICRR train operations assisted with the sequence for removing the old bridge elements and constructing the new ones. Workers' exposure to rail traffic was minimized by avoiding any temporary shoring within the railroad tracks. The tracks within the railyard were blocked in groups of four to six at a time for cutting and lowering the beams for removal, and a similar approach was adopted for erecting the new steel girders. Two cranes, a movable crane near the abutments and another crane within the railyard, were used to pick, erect, and splice the girder segments in the air.

Maintenance of traffic (MOT) planning was made challenging by various entry and exit ramps from the two interchanges, the Neil St. interchange on the west and the Lincoln Ave. interchange on the east of the construction limits. Instead of staging the individual superstructures and having multiple deck pours and joints, a median crossover was used to shift all the traffic to one bridge deck, and the two directions were separated by a temporary barrier. The median crossover and the temporary lighting were installed



during the 2020 construction season, and beginning in April 2021, eastbound traffic was moved to the existing westbound bridge while the eastbound bridge was removed and reconstructed. Then, in April 2022, all four lanes of traffic were moved to the newly constructed eastbound bridge while the westbound was removed and reconstructed. In addition to maintaining traffic on the bridge, alternate routes for both directions were also provided to reduce the impact of construction on drivers. Sangamo was required to return traffic to its pre-construction configuration each winter. Working on one bridge at a time greatly improved safety in the work zone,

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left: Two cranes, a movable crane near the abutments and another crane within the railyard, were used to pick, erect, and splice the girder segments in the air.

below: The new four-span bridge consists of continuous welded steel plate girders made composite with the reinforced concrete deck for their full length.





Metallizing was chosen for its typical service life of 40 to 50 years, flexibility in spot metallizing or painting as needed, and the fact that it would reduce the number of field splices over the railroad when compared to galvanizing.

.....
 shortened the construction duration, and reduced the overall cost of the project.

The design and construction of the new I-74 bridge is a sterling example of a timely and well-executed asset management project where selective reuse of existing substructures eliminated significant hurdles and challenges of working within a busy railroad yard. The project, completed this past November, also highlighted the efficiency derived from having the preliminary and final engineering performed by the same team, where the insights and experiences gained from the preliminary phase helped expedite the preparation of plans, specifications, and estimates on an accelerated schedule—all within three months of preliminary concept approval. ■

Owner

Illinois Department of Transportation

General Contractor

Sangamo Construction, Springfield, Ill.

Structural Engineer

EXP, Chicago

Erection and Demolition Engineer

TWM, Columbia, Ill.

Steel Fabricator and Detailer

Industrial Steel Construction 
 Gary, Ind.

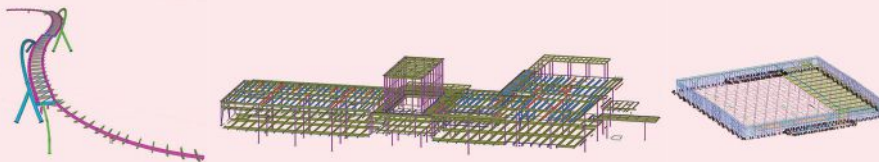


Kamlesh Kumar is a senior structural engineer with EXP.



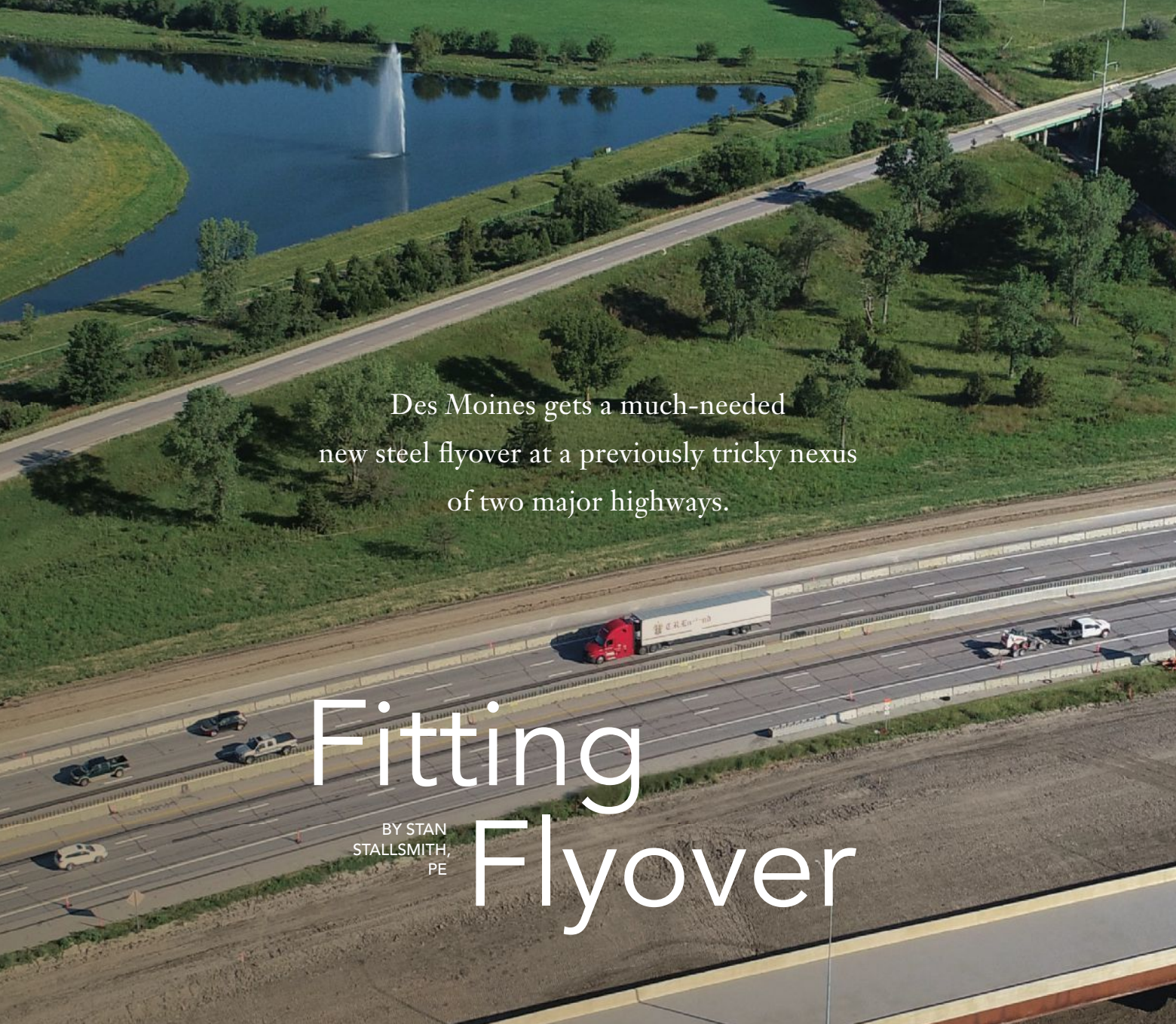
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An aerial photograph of a highway interchange in Des Moines, Iowa. A multi-lane highway runs horizontally across the lower half of the image. A bridge, the steel flyover, crosses over the highway. In the background, a large pond with a fountain is visible, surrounded by green grass and trees. The sky is clear and blue.

Des Moines gets a much-needed
new steel flyover at a previously tricky nexus
of two major highways.

Fitting Flyover

BY STAN
STALLSMITH,
PE

IF YOU LOOK AT A MAP of Des Moines, Iowa—digital or paper—you may notice a distinct rectangle formed by Interstates 35, 80, and 235.

You may also notice another major, north-south highway—Iowa 141—that converges with the northwest corner of this rectangle, where the towns of Urbandale and Grimes meet.

This convergence, along with its entrance/exit ramps, had long been known for congestion and safety issues—but a new steel flyover bridge on IA 141 has helped alleviate these issues.

As a critical element of the overall interchange reconfiguration, the bridge's planning and design needed to address several corridor constraints, multiple construction staging and safety challenges, and geotechnical challenges, as well as accommodate a future collector-distributor concept parallel to the I-35/I-80 mainline.

The existing interchange was a folded-diamond configuration, with nearly 90% of the northbound traffic exiting the Interstate turning right to go north on IA 141. But to do so, drivers had to

go through several traffic signals before leaving the interchange area, and traffic often backed up onto the Interstate, resulting in delays, congestion, and crashes. In response, the City of Urbandale and adjacent communities sought a solution to create a safer interchange with better traffic flow and promote economic development in the area.

The Iowa Department of Transportation (IDOT) studied several solutions ranging from improvements to the existing interchange configuration to a complete overhaul. “Right-sizing” the solution through context-sensitive design led to the steel flyover concept, which took just under two years to complete.

The crossing is a 2,380-ft-long, 36-ft-wide continuous welded steel, horizontally curved girder bridge that carries northbound traffic exiting I-35/I-80 onto northbound IA 141. The horizontal alignment of the bridge is unique in that it includes two reverse curves. The bridge is divided into three superstructure units separated by finger plate expansion joints. Each unit has a horizontal curve in only one direction, simplifying the steel girder design,



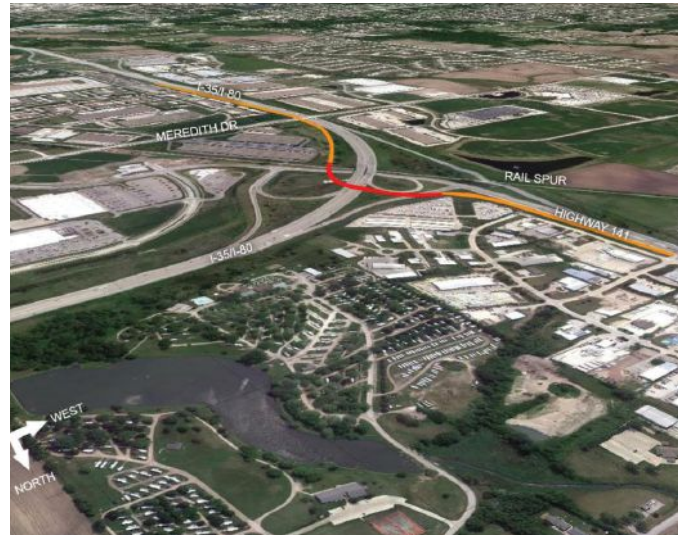
All images, except as otherwise noted, are courtesy of HR Green

above: Construction of the Ramp B Flyover Bridge took just under two years to complete. The flyover concept resolved the congestion and safety challenges at the IA 141 interchange with I-35/I-80 in the northwest Des Moines metro area.

right: Eliminating the exit loop ramp and building the flyover bridge comprised the cornerstone sequence to solve traffic challenges at the interchange. In the 1970s, the area was rural in nature, and northbound traffic from I-35/I-80 could use an exit loop and continue directly north on IA 141 without stopping. As the metro area grew, travel patterns changed to the point where the existing loop ramp configuration simply could not handle the traffic volumes.

.....

fabrication, and construction, and each was superelevated in a different direction that needed to be transitioned between units. Placing the piers between units at the location of the reverse curvature minimized the drainage that would cross the road in the transition zones and allowed the finger joints to be located where the cross section was level.

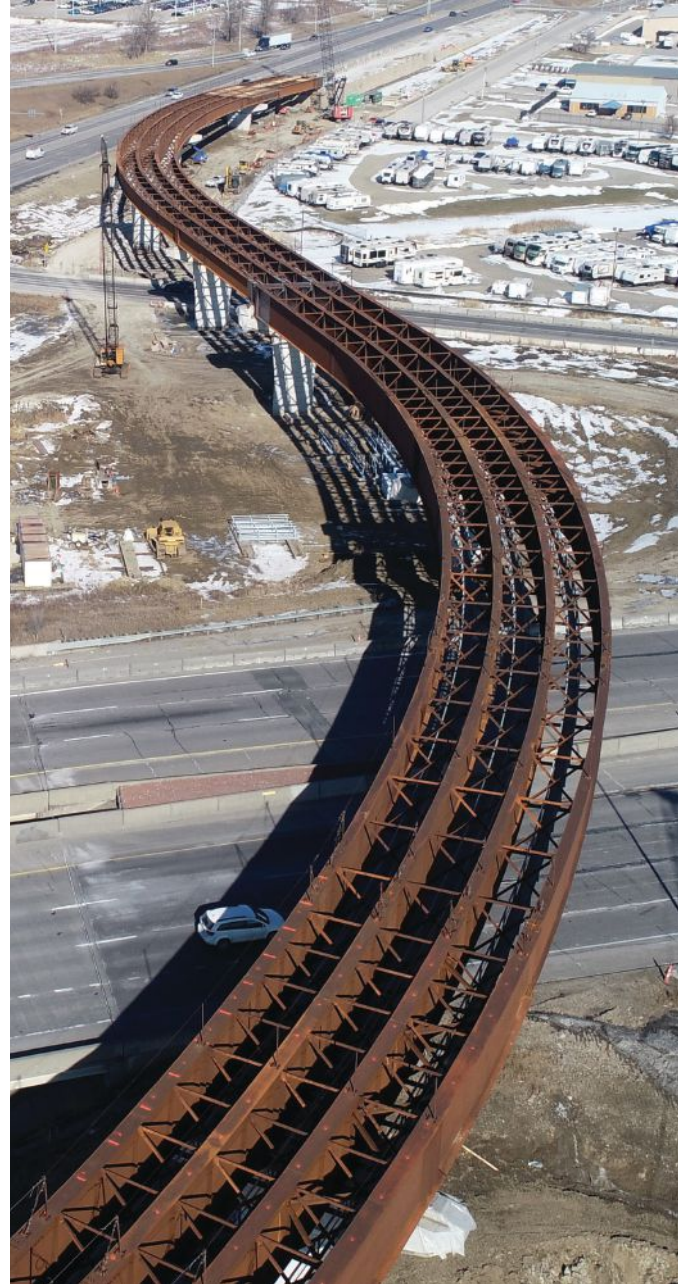
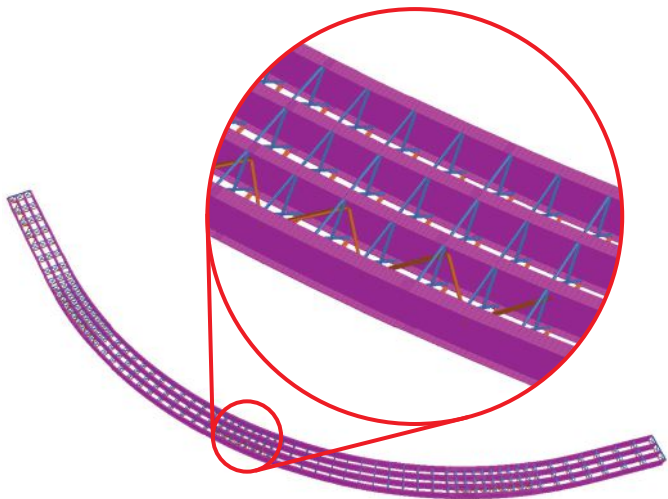




above: Traffic safety, both during construction and moving forward, influenced the flyover's main span design, which eliminated a pier in the Interstate median. The contractor was allowed to close the freeway from 11:00 p.m. to 5:00 a.m. for girder erection.

right: The 300-ft long curved main span used 12-ft-deep girders, which required collaboration with the steel fabricators and haulers to develop a beam that could be fabricated and shipped to the construction site.

below: The steel package for the bridge totaled just under 3,100 tons. Typical Units 1 and 3 cross frames are K-braces, while typical Unit 2 cross frames are X-braces.



Corridor Constraints

In addition to IA 141 and I-35/I-80, the bridge also needed to cross over the Iowa Interstate Railroad, two existing interchange ramps, one new interchange ramp, and proposed future ramps. The bridge also passes under a major electric transmission line, and the area surrounding the interchange is occupied by commercial, retail, and housing developments, making significant expansion beyond the existing right-of-way costly with potential environmental impacts. In addition, the north landing of the flyover needed to be positioned with adequate separation from an adjacent signalized intersection to allow merging and sorting of traffic.

These constraints led to the design team creating a horizontal geometry featuring a 600-ft radius curve for the main spans of the bridge. This radius limited the design speed to only 40 mph, and a design exception was required because the barrier rail obstructs drivers' views around the inside of the curves, resulting in insufficient horizontal sight distance. In order to improve sight distance,

the roadway pavement markings shifted the shoulder widths between the reverse curves, keeping the 8-ft-wide shoulder adjacent to the inside of the curve where sight distance was restricted and reducing the outside shoulder width to 4 ft.

The flyover's vertical alignment includes a single vertical curve with a maximum grade of 4%, and the critical vertical clearance point is located where a future widened lane of I-35/I-80 will pass under the bridge. This alignment also provided at least the minimum vertical clearance over the railroad, IA 141, existing and relocated exit/entrance ramps, and future collector-distributor roadways.

Structural Design and Details

The substructure layout was developed from the center of the bridge out, with the spans over the Interstate and over IA 141 and the railroad being established first. During preliminary design, the team decided against including a pier in the median of I-35/I-80, resulting in a 300-ft main span. While a pier would have reduced

One of the bridge's innovative features is its use of inspection catwalks. The catwalks are located where the bridge spans above traffic and support the DOT's goal of minimizing traffic impacts by allowing inspection and maintenance to occur with minimal impacts both on and under the bridge.



maximum span lengths, it could not have been built radial to the horizontal curve, which would have complicated the girder design. A second 300-ft span over IA 141 and the railroad provides just enough clearance to construct the pier adjacent to the railroad. With two 300-ft main spans on a 600-ft radius, the team realized the ideal depth of the girders was going to be extreme.

The project also included aesthetic features, such as unique pier and abutment wing and mask wall shapes, concrete rustication, and concrete coating color, to complement other bridge projects in the corridor and incorporated mechanically stabilized earth (MSE) walls, intelligent transportation system (ITS) equipment, signage, and continuous corridor lighting. With the differential thermal movement of the superstructure at the expansion joints, the utility conduit, which would normally be embedded in the barrier, would not function as desired and could actually cause the concrete and conduit to crack. Therefore, the conduit was attached to the bottom of the deck using hangers. The north abutment required the addition of a dead man anchor to aid in the horizontal resistance of the abutment within the MSE wall reinforcement area.

After the alignment was set during preliminary design, several alternative superstructure types were considered. The two 300-ft main spans in Unit 2 define the overall look of the bridge, while the span lengths in Units 1 and 3 were shorter, with maximum spans of 215 ft and larger radii, to allow more flexibility. In Unit 1, where the radius of the horizontal curve was almost 2,500 ft, the team considered using prestressed beams, but these would have required at least one more pier and resulted in an extreme change in girder depth between Units 1 and 2. Ultimately, IDOT preferred not to mix steel and concrete superstructure types between units, so Unit 1 was designed as a two-span steel plate girder superstructure with a girder depth of just under 8 ft and a 90-in.-deep web. (The design team also considered using a mix of concrete and steel box girder sections, but this idea was ultimately rejected because box girder bridges are not common in Iowa, and IDOT anticipated the cost for these types of superstructures would be higher than steel girders due to local contractors' unfamiliarity.)

Once the decision was made to use curved steel girder sections throughout the bridge, structural engineer HR Green began coordinating with NSBA, steel fabricators such as Stupp Bridge and DeLong's, and the Associated General Contractors of Iowa to gain a better understanding of the limitations of fabricating, shipping,

Geotechnical, Maintenance, and Adaptability Considerations

The final length of the bridge was partially determined by geotechnical considerations. Due to poor underlying soils, using large embankments would have resulted in excessive settlement. Therefore, rather than shorten the bridge length by using tall fills or long MSE walls, fill heights were limited and abutment locations were determined accordingly. Even with the limited fill heights, intermediate foundation improvements were required under the embankment at the south end of the bridge and under the MSE walls at the north end of the bridge.

All substructure elements are supported by steel H-piles between 80 ft and 110 ft long, and United was required to wait a minimum of 30 days following the completion of the approach fills before driving the south abutment piles. The piles at the north abutment were designed to accommodate down-drag forces, and all piles developed their resistance in friction through multiple layers of predominately firm to very firm clay layers with no reliance on end bearing.

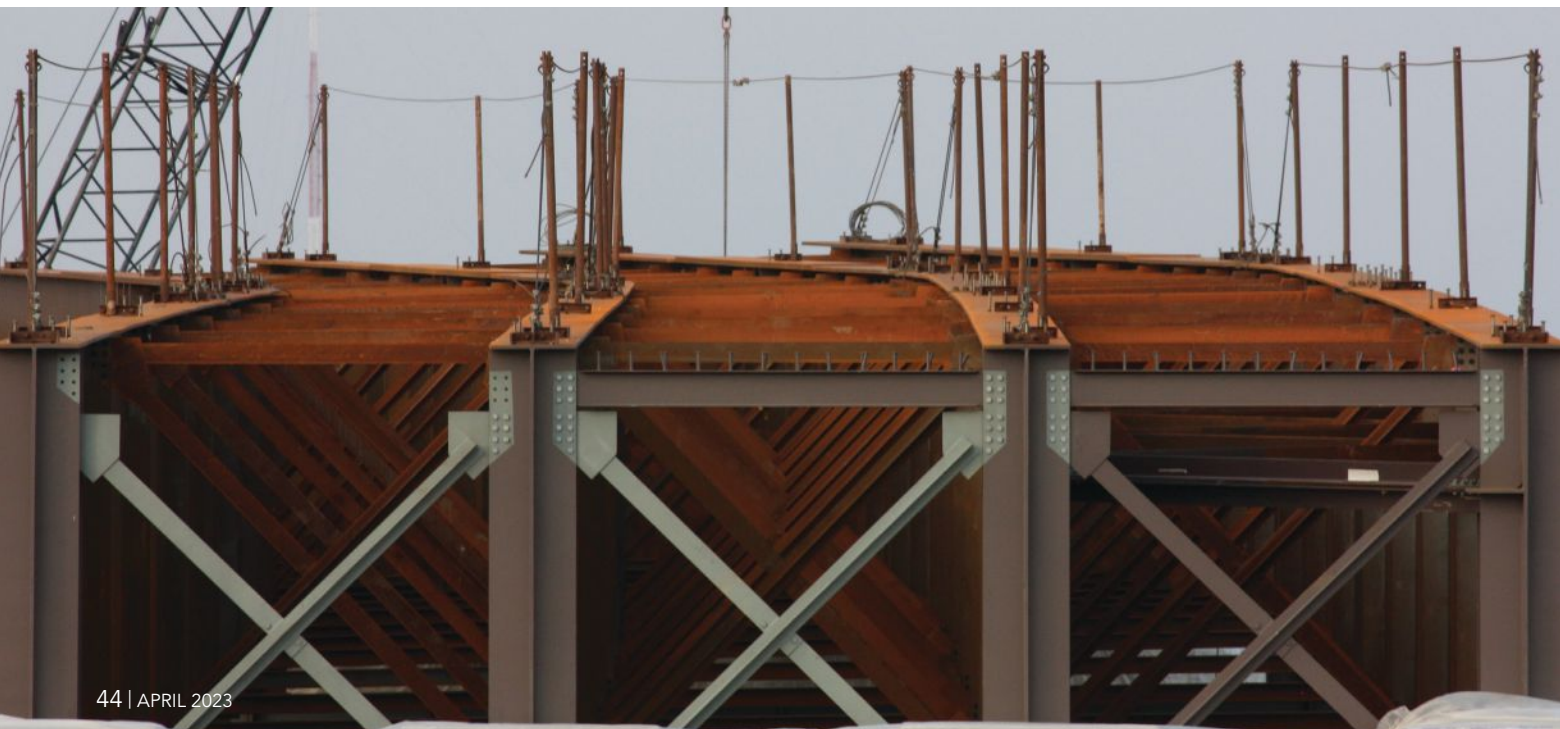
IDOT was concerned with how inspectors would access the bridge and wanted to avoid lane closures during inspections if possible. Therefore, inspection catwalks and cables were provided where the bridge goes over traffic to allow inspection to occur with minimal traffic impacts both on and under the bridge.

Given the length (300 ft) of the main spans, there was concern about long-term deck cracking and the desire to minimize maintenance operations on the deck. A multi-layer polymer concrete overlay was installed to not only mitigate cracking and protect the deck but also provide additional surface friction on the curved alignment. The overlay consists of an epoxy-resin base bonding formulation and crushed aggregate with a gradation of 100% of the aggregate passing through a No. 4 sieve. The procedure for placing the overlay included shot-blasting the deck to prepare the surface, distributing the epoxy resin on the work area, spreading the aggregate over the work area, and using compressed air to remove all dust and loose material. The overlay was placed in two separate courses to provide a total surface raise of $\frac{3}{8}$ in., with the overlay thickness tapered down to no surface raise at joints and deck drains.



above: The project included developing aesthetic features to match other bridge projects in the corridor as well as using MSE walls to shorten the bridge as much as possible and limit right-of-way needs.

below: Deflections of the outside girder controlled the flange design. Rather than making all four girders identical, slightly wider and thicker flanges were used for the exterior girder only in Unit 2.



and erecting the girders. The fabricators shared guidelines on items like the maximum sweep of individual girder sections, maximum plate lengths for fabrication, and girder depths and weights that were reasonable for fabrication and shipping. This information was used to set the Unit 2 girder depth at approximately 12 ft with a 138-in. web depth and the maximum spacing between field splices at no more than 100 ft. Hybrid girders with higher-strength steel in some flange locations were also considered, but the team determined that using A709-50W steel for all the girders was the most economical solution. All weathering steel was left uncoated except where it was adjacent to expansion joints. The 12-ft-deep Unit 2 girders were fabricated by Stupp Bridge in its Bowling Green, Ky., location, while the shallower, 8-ft-deep, Unit 1 and 3 girders were fabricated by DeLong's in Jefferson City, Mo.

HR Green completed the final superstructure design using a grid model analysis methodology via MDX software supplemented with a STAAD 3D model. Engineering sub-consultant Modjeski and Masters (M&M) performed an independent peer review of the final superstructure design and a girder erection analysis. M&M used AASHTOWare to model and analyze the structure and developed a 3D model to perform a finite element analysis (FEA) of the girder system during each stage of the steel erection.

Typical Units 1 and 3 cross frames are K-braces, while typical Unit 2 cross frames are X-braces. All bracing members are either WT or MC sections welded to gusset plates and bolted to stiffeners. While not required for the final condition, the girder erection analysis determined lateral bracing was needed at specific locations in Unit 2 only during girder erection to satisfy wind loading conditions, but it ended up being left in place permanently.

The final design of the substructure assumed stub abutments and a single fixed pier in each unit. Elastomeric bearings were used in Unit 1, and disc bearings were used in Units 2 and 3 to accommodate movement in multiple directions where the radius of the curved girders is tighter and changes direction. The steel package for the bridge totaled just under 3,100 tons at a cost of \$1.41 per lb. The final total construction cost of the bridge was approximately \$19.8 million, which translated to approximately \$232 per sq. ft of deck area.

Construction Staging and Safety

A major challenge was locating each of the bridge's ten piers to minimize traffic restrictions during construction while also accommodating future construction. All but one pier was located outside of the various roadway and railroad clear distances, minimizing the need for protective concrete barriers. Eliminating a median pier improved safety for mainline traffic during construction, by reducing staging phases required to construct the pier, and permanently because there were no changes to the median barriers. The final pier locations required considerable temporary shoring adjacent to the Interstate.

Prior to construction, the MidAmerican Energy transmission line that spans over the bridge alignment was raised to provide sufficient clearance over the final bridge. Due to other site constraints, Pier 3 was located almost directly under the transmission line, and United Contractors was required to configure its crane setup, especially during pile driving and girder erection, to avoid impacting the transmission line. United also had to maintain three lanes of traffic in each direction on the Interstate during all stages of construction. The

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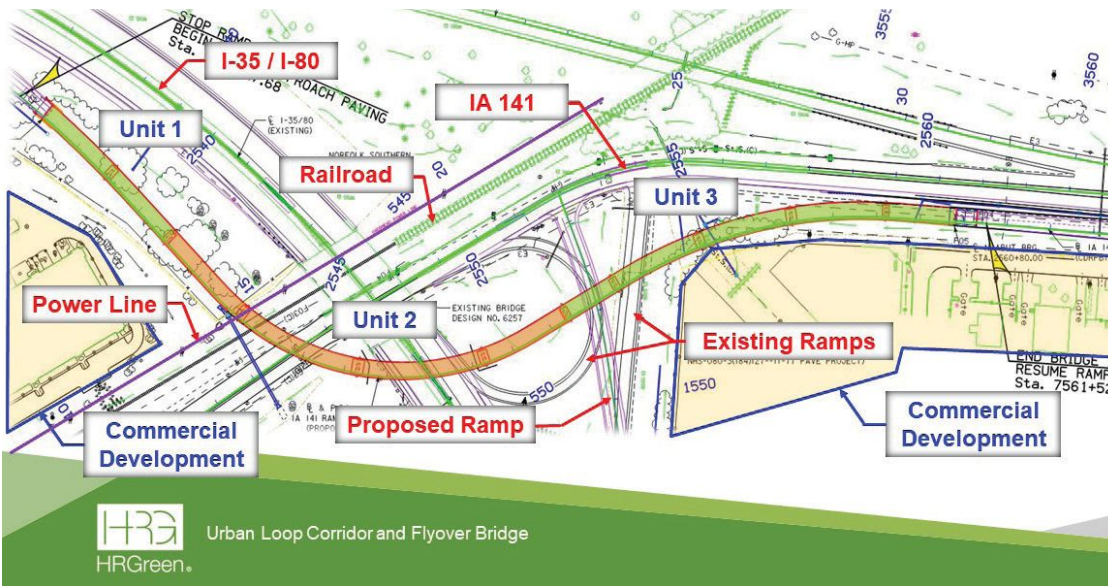
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The flyover bridge crosses over a railroad, a state highway, an Interstate highway, existing ramps, new ramps, and future planned ramps. The bridge also passes under a major electric transmission line and bypasses existing commercial developments.

Bridge Stats

Total structure length: 2,380 ft
 Span lengths: Unit 1: 195 ft and 195 ft
 Unit 2: 240 ft, 300 ft, 300 ft, and 240 ft
 Unit 3: 130 ft, 215 ft, 215 ft, 215 ft, and 160 ft
 Width: 36 ft
 Total steel tonnage: 3,100 tons

- Coating/protection system: Weathering steel was used for all girders. Weathering steel within a distance of 1.5 times the girder depth on each side of the expansion joints was painted with a prime coat of zinc silicate paint and a topcoat of waterborne acrylic paint. Catwalks, expansion joints, and deck drains were galvanized.



Courtesy of City of Urbandale, Iowa

There is a traffic signal on IA 141 about a half-mile north of the end of the bridge. Because of the combination of the limited sight distance around the curves and the vertical profile of the bridge, an ITS queue detection warning system was implemented, and there are two sets of "Be Prepared to Stop" warning signs with flashers on the bridge. The flashers near the north end of the bridge are synched with the traffic signals, and both sets of flashers are connected to radar detectors to warn drivers of slowing and stopped conditions ahead.

exception was two full closures, restricted to between 11:00 p.m. and 5:00 a.m., for erecting the girders spanning the Interstate.

Right-Sizing

The right-sizing effort applied to the entire project resulted in a future configuration featuring collector-distributor roadways parallel to I-35/I-80 connecting adjacent interchanges and allowing weaving of traffic to occur off the mainline. The team used Bentley OpenRoads ConceptStation for 3D modeling to examine the future geometry and adapt the current project to future conditions, an approach that kept the project budget within programming limits to achieve current critical goals while also providing for future expandability.

Regarding this, another planned element is set for the arterial 37th Street intersection, north of the flyover on IA 141. In recognition of the heavy northbound traffic volume through this intersection, the concept for a grade separation over 37th Street was developed and approved by the Federal Highway Administration (FHWA). The idea is to keep flyover traffic destined for locations north of 37th Street separate from local traffic at the intersection, and a future bridge over 37th Street would further alleviate queuing risk to the free-flow nature of the flyover, making traffic flow more reliable.

The design and construction of the IA 141 Flyover bridge at I-35/I-80 provided an opportunity for federal, state, and local agencies to collaborate with consultants, contractors, and fabricators to produce a valuable asset for the traveling public and the surrounding communities. The project overcame design and construction challenges to convert a sometimes-dangerous interchange into the right-sized flyover bridge and create a safe, efficient, and attractive addition to the Des Moines transportation system. ■



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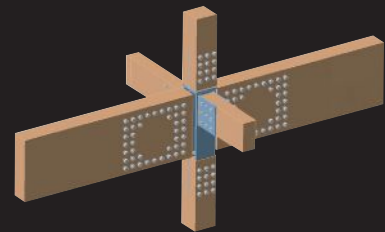
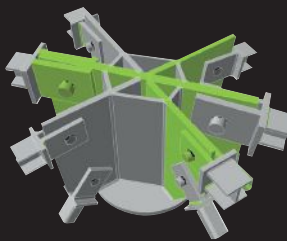
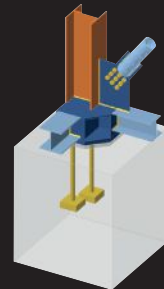
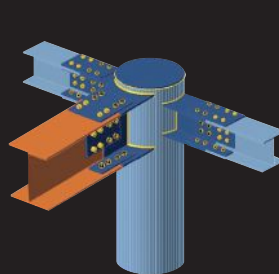
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Is Single-Coat Inorganic Zinc Enough to Protect Steel Bridges?

BY THOMAS MURPHY, PE, PhD, TRAVIS HOPPER, PE, AND JENNIFER MCCONNELL, PhD

Nearly 30 years after single inorganic zinc coatings were first tested, research confirms their effectiveness in preventing corrosion.

INORGANIC ZINC (IOZ) is a common primer in three-coat paint systems for steel bridge structures.

Such systems often include an IOZ primer, an epoxy intermediate coat, and a urethane topcoat. The application process can take considerable time, and the needed curing times represent a significant portion of the fabrication time—which begs the question: Can bridge steel be protected by just the zinc coat alone?

In the early 1990s, several states decided to use IOZ alone as a single coat to provide corrosion protection on steel bridges. The first known uses of single inorganic zinc oxide (SIOZ) coatings in the United States were in 1993 and 1994 by the Missouri and Virginia Departments of Transportation, respectively.

Nearly 30 years after the first use of SIOZ on highways in the U.S., the National Steel Bridge Alliance (NSBA), a division of AISC, sponsored a literature review and field inspections to determine the effectiveness of SIOZ coatings at preventing corrosion. Field inspections were conducted for 18 bridges with SIOZ coatings in the three states where the use of SIOZ is known: Missouri, Washington, and Virginia.

Findings revealed that, like other paint systems, SIOZ coatings provide barrier protection to the underlying steel. A secondary benefit of SIOZ is that the high amount of zinc provides cathodic protection at any breaks in the coating. Overall, SIOZ is a cost- and time-efficient way to prevent moisture, oxygen, and contaminants from reaching the surface of the substrate steel.

SIOZ is Protective and Cost-Effective

The primary advantages of SIOZ are its cost-effectiveness and high-quality corrosion protection. Like any coating system, SIOZ provides barrier protection for the steel. However, it also develops beneficial corrosion byproducts when the zinc reacts with oxygen, carbon dioxide, and water in the atmosphere, which can enhance corrosion protection. SIOZ can also provide cathodic protection against scratches, gaps, or other defects in a coating when intermediate and topcoats are not used. The inorganic nature of the coating is unaffected by ultraviolet radiation from the sun, temperature (after curing), bacteria, and fungus.

In addition, SIOZ coatings can provide material savings due to the need for less coating and a reduction in application time, resulting in reduced fabrication time and labor costs. SIOZ is also a cost-effective protection system for both field and shop applications, based on research. Other advantages of SIOZ include that it provides a hard coating relative to many other paint systems.

Water-based SIOZ systems offer some additional advantages. Unlike solvent-based SIOZ, water-based coatings do not contain volatile organic compounds, which may present adverse health effects and be subject to increased regulations. Water-based formulations are also harder, with better abrasion resistance, and typically have slightly higher zinc content and higher specified dry film thickness (DFT).



Shop Application Considerations

An important consideration when it comes to SIOZ is its sensitivity to surface preparation and curing conditions. However, these issues can be mitigated by following proper surface preparation procedures for pretreatment, cleaning, blasting, and avoiding contamination, as well as allowing SIOZ to cure in the appropriate temperature and humidity ranges. These surface preparation requirements are more difficult to achieve in field conditions but are by no means impossible with proper quality control. The initial porosity of the coating allows both for the absorption of contaminants (e.g., oils and greases) and the difficulty of removing them. Also, solvent-based SIOZ requires a relatively high humidity level to cure in a timely manner. Therefore, given the choice, shop application is preferable to field application.

Another consideration with SIOZ coatings is their tendency to “mud crack,” which denotes a fine pattern of cracks in the paint. This typically occurs when the coating thickness is excessive, most commonly at welds and in internal corners where the coatings are applied with several overlapping passes to fully coat each connecting surface. Mud cracking can also occur with high relative humidity combined with poor ventilation during application. Mud cracking can be avoided by staying below the appropriate maximum specified DFT values. However, achieving a DFT that is greater than the appropriate minimum specified value is more important than mud cracking resulting from excessive DFT.

All of that said, with the proper application by knowledgeable fabricators, any challenges are easily mitigated. In addition, you can add the Complex Coatings Endorsement (CCE) to your project specification since it will reduce your risk of application and performance issues. This optional endorsement’s governing document is the *Standard for Shop Application of Complex Protective Coating Systems* (AISC 420-10), which was developed as a joint effort with the Society for Protective Coatings (SSPC)—which recently merged with the National Association of Corrosion Engineers (NACE) to form the Association for Materials Protection and Performance (AMPP)—to streamline the criteria for both the marketplace and industry. The program evaluates the qualifications of structural steel fabricators and component manufacturers who apply complex or industrial protective coatings, such as zincs, epoxies, urethanes, or multi-coat systems, in their paint shops following fabrication. (You can view the relevant reference documents at aisc.org/certification/certification-categories and find fabricators certified to CCE at aisc.org/certsearch.)

Organic or Inorganic?

There are basically two coating types for primers: organic or inorganic zincs. Compared to inorganic zinc, organic zinc coatings are less sensitive to surface preparation quality, can be applied over wider temperature ranges, typically do not rely on temperature and/or humidity for proper curing, and are arguably easier to repair and overcoat. Inorganic zinc coatings, on the other hand, chemically bond to the steel substrate and are typically unaffected by sunlight and temperature in service, which results in better corrosion protection. One example is the performance of inorganic zinc compared to organic zinc in marine environments. Following an evaluation by NASA in which inorganic and organic coatings were exposed to a marine environment for up to ten years, the researchers concluded that IOZ primers were “the best choice to provide long-term corrosion protection of launch structures and ground support equipment.”

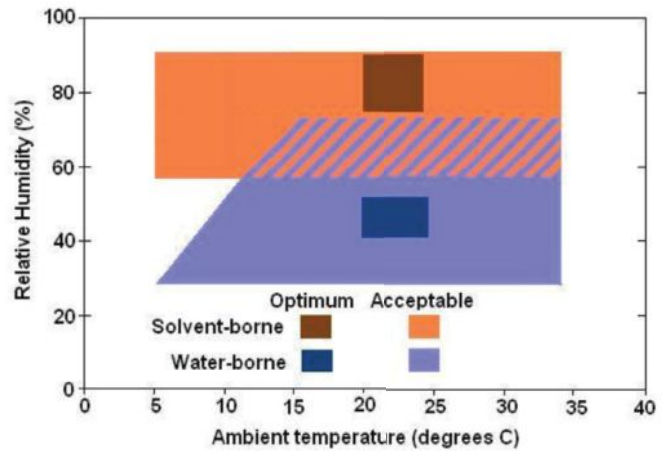


Fig. 1. Optimum and acceptable curing conditions for solvent-based and water-based SIOZ.

Other Considerations When Using SIOZ

Following extensive study and field inspections, bridge owners can be reassured that SIOZ is an effective method of preventing corrosion and extending the service life of a bridge in at least some environments. When considering SIOZ coatings, there are several areas of attention that will help prolong the coatings’ usefulness.

The environment should first be considered to ensure SIOZ will provide adequate performance. To date, no influence of macro-environments has been observed on SIOZ bridges, but it has not been tested in particularly severe macro-environments.

Like all corrosion-protection systems, SIOZ coatings are susceptible to deterioration where aggressive micro-environments exist. Aggressive micro-environments caused by leaking drainage systems should be eliminated, or additional protection strategies should be employed. Deck joints should be eliminated whenever possible. If joint elimination is not feasible, deck joints and drainage systems should be properly maintained. Beneath deck joints, increased frequency of maintenance painting should also be considered. As with other coating systems, SIOZ is susceptible to accelerated deterioration in the splash/spray zone of highway overpasses.

It is extremely important that the curing conditions, including temperature and humidity, are in an optimal range (Figure 1). Otherwise, the time to cure and chemical reactions during curing may be affected, which can impact the overall performance of the coating. If the curing conditions do not meet the necessary requirements, then the coating type will need to be changed or it will be necessary to wait until curing conditions become favorable.

During surface preparation and application, attention should be given to the edges and bottom surfaces, welds, and bolted connections to ensure they are properly coated but not to excess. The dry film thickness should be clearly specified to ensure that the coating is thick enough to provide proper protection but not so thick that mud cracking occurs.

Once construction begins, contact with coated surfaces should be avoided. If that is not possible, methods to protect the coating where in contact should be employed.

In addition, it’s also important to note that the range of available SIOZ colors is limited and ranges from green to gray.

With nearly 30 years of use in the field, SIOZ has proven that it can serve as more than a primer and is an effective coating method on its own in at least some situations. At the end of the day, SIOZ can save time and money as long as environmental and curing conditions are appropriate and proper care is taken during application and installation. ■

For more on SIOZ, check out the session “Making a Single Coat of Inorganic Zinc Primer the Sole Corrosion Protection System a Reality for Steel Bridges” at NASCC: The Steel Conference, taking place April 12–14 in Charlotte. You can learn more about the conference and register at aisc.org/nascc.



Thomas Murphy is Chairman of the Board, senior vice president, and chief technical officer, and **Travis Hopper** is an engineer, both with Modjeski and Masters. **Jennifer McConnell** is the Bentley Systems Career Development Professor with the Department of Civil and Environmental Engineering at the University of Delaware. All three are authors of NSBA’s *Uncoated Weathering Steel Reference Guide*, available at aisc.org/uwsguide.



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Addressing Acoustics

BY ROBERT CONNICK

Considerations for sound isolation and noise control in steel buildings.

ACOUSTICS IS SOMETIMES described as an invisible science.

Not only is sound itself invisible, but the acoustic design of a building is often hidden in the details, spread across multiple trades. The three primary aspects of building acoustic design are generally: room acoustics, sound isolation, and mechanical system noise and vibration control. Among these three, one of the most essential in every building type is proper sound isolation. Steel-framed buildings can provide robust sound isolation between spaces if designed, detailed, and constructed correctly.

In the May 2020 SteelWise article “Sound Control” (www.modernsteel.com), we discussed the basics of sound, how it propagates through buildings, and the basic tools for achieving good sound isolation. Here, we’ll dig a little deeper into some of the specific benefits that steel framing has over other construction types.

For a single-stud wall (typically with one to two layers of gypsum board on each side and insulation in the cavity), using a steel stud will result in significantly better acoustic performance than using a wood stud (see Figure 1). This mainly has to do with the rigidity of the stud itself. Wood studs are stiffer, meaning that once the sound is in the structure, it will more easily propagate through to the other side (where it will excite the gypsum board on the far side and radiate into the room). Metal studs, by comparison, are usually more flexible, creating a less rigid connection between the separate masses (in effect, providing a better degree of separation). A single-stud wall with two layers of gypsum wallboard (one on each side) and batt insulation in the cavity is likely to achieve a sound transmission class (STC) rating in the low 40s with a wood stud, while the same partition using a metal stud could achieve an STC rating of around 50 or higher.

Likewise, lighter-gauge studs will perform better acoustically than heavier-gauge studs, and greater stud spacing will provide better sound isolation than smaller stud spacing. As an example, with all else being equal, a partition with 25-gauge studs spaced 24 in. on center will achieve an STC rating that is 5 (or more) points higher than a partition with 20-gauge studs spaced 16 in. on center.

With more modern developments in steel stud manufacturing, “equivalent-gauge studs” can meet the same structural and other

construction requirements while using less material and creating an even more “flexible” stud. This also corresponds to better acoustic performance relative to studs with thicker material.

Why is this important? STC 50 is something of a magic number when it comes to demising assemblies in buildings. The *International Building Code* requires a minimum STC rating of 50 between dwelling units, and many sustainability accreditations (such as LEED, WELL, CHPS, and others) require a minimum STC rating of 50 between adjacent classrooms and other sensitive learning spaces. This rating is much more easily achieved with light-gauge steel framing than with other construction types. Likewise, when resilient channels or clips are also added, steel framing can achieve higher overall performance than equivalent wood framing (which can be particularly important for highly sensitive adjacencies like residences or offices where speech privacy is essential).

The same concepts of mass and separation apply to the floor/ceiling assembly as well. Composite steel and concrete decks sit in something of a middle ground between the wood frame and concrete slab constructions when it comes to weight and performance. A steel deck with even a few inches of concrete topping can achieve moderately high sound isolation performance, and while this may not be sufficient to meet code requirements on its own, it provides a substantial starting point for further upgrades. For example, with a typical composite steel deck with 3 in. to 4 in. of concrete topping, the addition of a typical mineral fiber acoustic tile ceiling is often sufficient to meet the sound isolation requirements for school projects. This would not be true for a wood frame assembly.

In most buildings, good acoustical design involves good acoustical separation, which means understanding the concerns of the spaces (i.e., what kind of noise will be present and who might it affect) and—critically—providing the right intervening wall and floor/ceiling assemblies. Steel framing can provide significant benefits over other construction types—again, when well designed. While the basics presented here can help set the baseline for the design, the control of sound transmission can be as complicated, and it is often best to consult someone with experience with acoustical design for the specific type of building construction at hand. ■

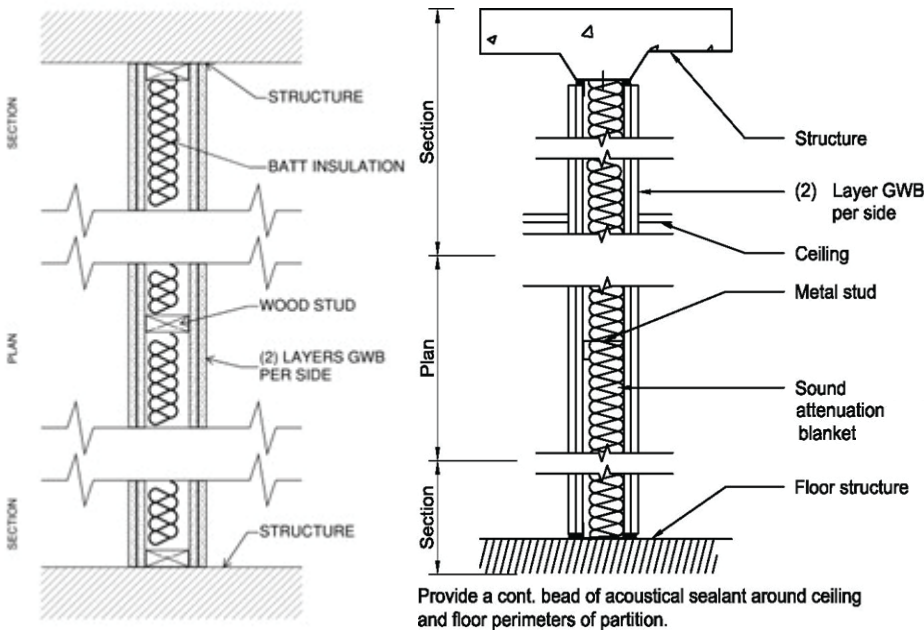


Fig. 1. A single-wood-stud wall versus a single-metal-stud wall. Both walls have the same number of layers of gypsum board, but the metal stud provides a greater degree of acoustical separation.

To learn more about sound control and noise isolation, see AISC's *Design Guide 30: Sound Isolation and Noise Control in Steel Buildings*, available at aisc.org/dg. And if you're at NASCC: The Steel Conference, taking place in Charlotte April 12–14, check out the session "Inherent Sound Isolation Characteristics of Steel Buildings." You can learn more about the conference and register at aisc.org/nascc.



Robert Connick (rconnick@acentech.com) is a principal with acoustic consulting firm Acentech.

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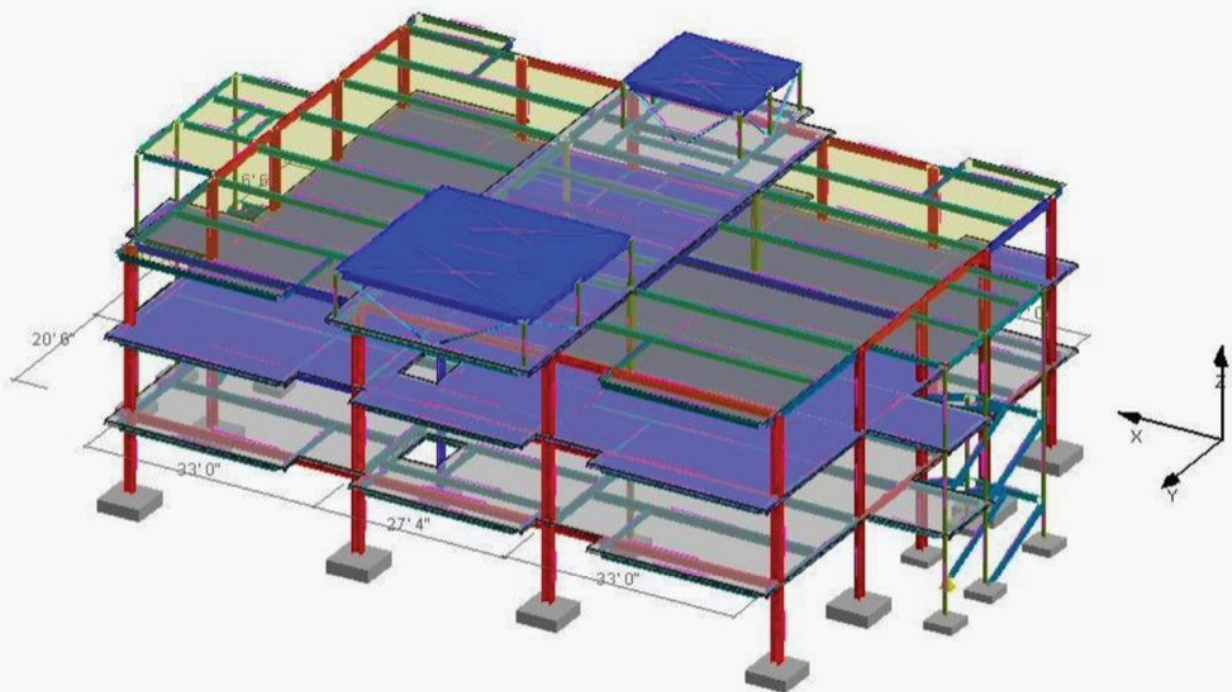
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Verifying the Verifier

BY SAM RUBENZER, SE, PE



Software is a given in structural design and analysis, but just remember that it's not the engineer. You are.

STRUCTURAL ENGINEERS are relying more and more on structural engineering software for analysis and design.

Understanding the different options available for modeling is paramount in ensuring that the best model is created to imitate reality and give engineers the best possible design.

The presentation “How to Verify SE Software” at the upcoming NASCC: The Steel Conference will review various methods for verifying the loads defined on models, the analysis results, and the design checks made for members within the model.

Before any verification can begin, engineers must first develop a software model to represent the actual physical structure they are to design. The key to building the model

is to be as accurate as possible, without adding unnecessarily complex details, to effectively design the structural elements. Here's a quick rundown of the process:

Verify the loads defined on models. Many of the programs today use a load generator to speed up the process of loading models. The software programs generally use rudimentary methods to determine tributary areas and then apply some of the options from today's design codes (from IBC, ASCE, etc.) to load members and/or diaphragms. Engineers should be accustomed to manually calculating the loads from the design code and should have a relatively easy time checking the overall magnitude of the forces that the software programs should be using.

Verify the analysis results. Once the software models are loaded and after a few settings are determined and set for the model, an analysis is run by the computer program. Most of the specific calculations of the programs are far too complex and time-consuming to check. Rather, it is an engineer's responsibility to check the overall behavior and possibly check their complex model against simpler and easier-to-understand models for comparison.

Verify the design checks. Engineers can rely on familiar material design codes (from AISC, STI, ACI, TMS, PTI, NDS, etc.) to run member-capacity checks. The process should be relatively smooth once the more complicated analysis results have been checked and verified. Often material design codes spell out the capacity equations in detail, and software programs apply these capacity checks en masse. Verifying that the capacity check is appropriately used should be a straightforward process.

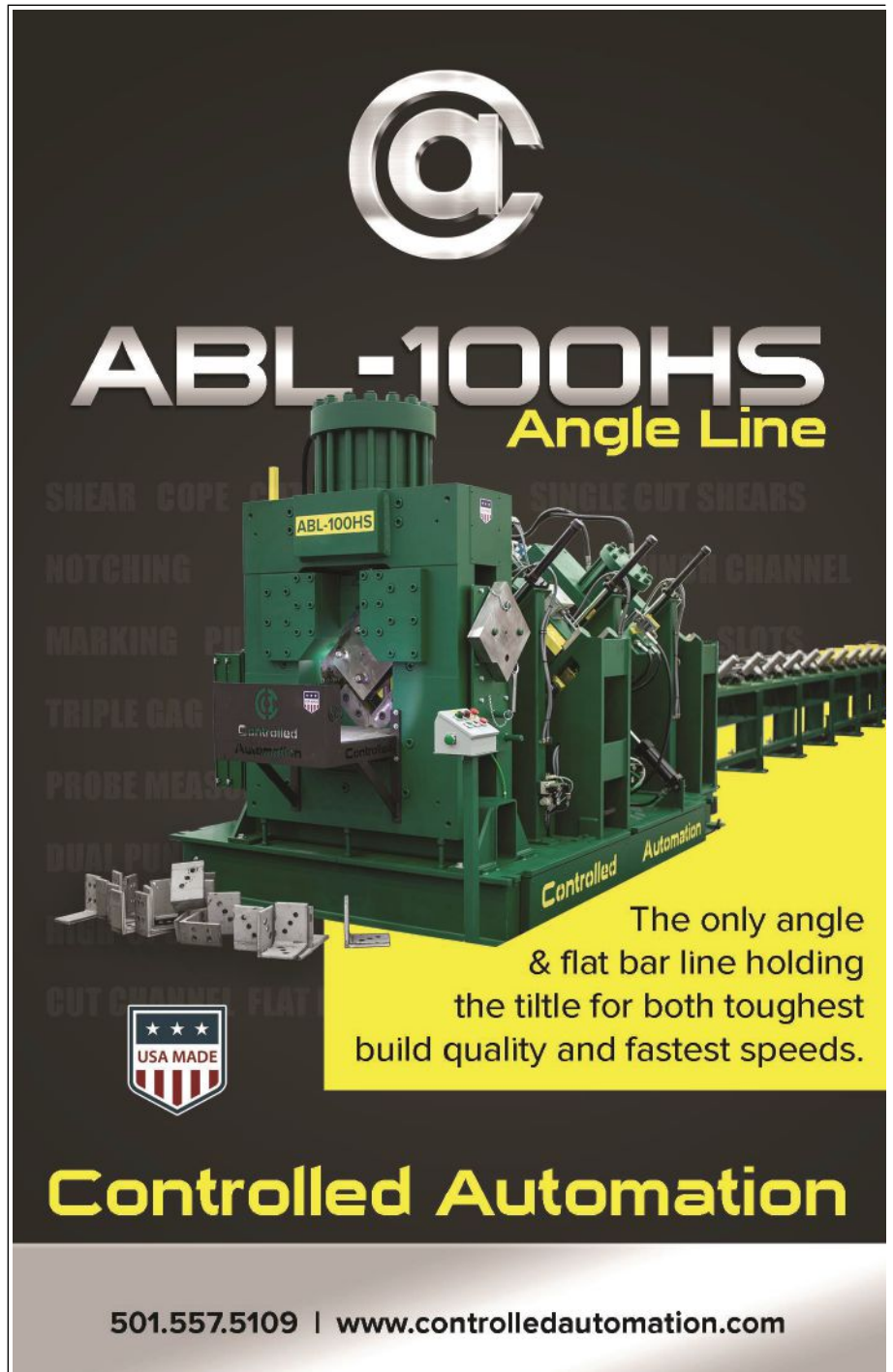
Software will make you a better engineer if you intuitively use the software as a tool and don't simply become an "operator." Don't assume the software is doing everything correctly. Don't assume the software is making the same decisions you would make. And above all, don't let the software make decisions for you. Structural engineers rely on education, experience, and guidance from various codes and are always responsible for using good engineering judgment. Again, software packages are tools, but you are the engineer. Never forget that.

Errors happen. Sometimes the error is in programming, and sometimes it is a user error. Engineers must have the knowledge and experience to spot these errors. Don't let the software think for you but rather use it to perform tasks and provide suggestions so as to let you do your job faster. ■

For more on how to get the most out of your structural engineering software, check out the session "How to Verify SE Software" at NASCC: The Steel Conference, taking place April 12-14 in Charlotte. You can learn more about the conference and register at aisc.org/nascc.



Sam Rubenzer
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www.aisc.org



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

American Punch Company

booth 1033

Euclid, Ohio

ph: 216.731.4501 | toll free: 800.243.1492

americanpunchco.com

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

American Steel Detailing, LLC

booth 2138

www.americansteeldetailing.com

American Welding Society

booth 2219

Miami

ph: 305.443.9353 | toll free: 800.443.9353

www.aws.org

The American Welding Society (AWS) was founded in 1919 as a non-profit organization with a global mission to advance the science, technology, and applications of welding and allied cutting processes, including brazing, soldering, and thermal spraying. AWS offers industry-respected certifications, industry-trusted technical standards development, technical standards sales, education, membership, and expositions.

AMPP

booth 2237

Houston

ph: 281.228.6200

www.ampp.org

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

Anatomic Iron Steel Detailing

booth 2019

North Vancouver,

British Columbia

Canada

ph: 604.841.0555

www.anatomiciron.com



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

Anthem Anchor Bolt and Fasteners, LLC

booth 1347

www.anthemabf.com

Applied Bolting Technology, Inc.

booth 1626

Bellows Falls, Vt.

toll free:

802.460.3100

www.appliedbolting.com



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

Applied Software Graitec Group

booth 1236

Atlanta;

Montreal, Quebec

Canada

toll free: 800.724.5678

www.graitec.com

GRAITEC (1986), Autodesk partner and authorized training center, is a long-standing software developer of design, simulation, fabrication, and management solutions for the steel industry.

Our extensive range of CAD, BIM, and analysis software combined with the Autodesk portfolio (Advance Steel, Revit) are used by structural engineers and detailers worldwide. With 50 offices in 13 countries, North American customers can count on us for all their needs: implementation, customization, training, workflow optimization, and technical support. Ask about Advance Steel drawing styles, our PowerPacks, Advance Workshop, Opentree.

ArcelorMittal International

booth 1841

Chicago

ph: 312.899.3051

www.arcelormittal.com

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

Armatherm

booth 1711

www.armatherm.com

Arteras, Inc.

booth 2228

www.arteras-inc.com

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

Association of Women in the Metal Industries

booth 2403

www.awmi.org

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

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Companies written in orange are part of the **Bridge Pavilion**.

Atema, Inc.

booth 1721

Chicago

ph: 312.861.3000

www.atema.com

Atema is dedicated to providing quality related training and assistance for the structural steel industry with a specialty in AISC, AWS, and ISO certification/registration programs. Atema provides customized training programs and executive management assistance to structural steel firms. Atema's projects and clients reach across four continents and eight countries worldwide, with their headquarters located in Chicago.

ATF WORLD, Inc.

booth 1344

www.atfworld.com

Atlas Tube, A Division of Zekelman Industries

booth 1432

Chicago

toll free: 800.733.5682

www.atlastube.com

Atlas Tube is the leading manufacturer of steel hollow structural sections (HSS) in North America, including the largest HSS made in America. Depend on our team to support you with answers to design-related questions and logistics support. With six manufacturing locations, we offer the largest HSS size range with the best availability in the industry for all specs including ASTM A500, A1085, A513, A252, and CSA G40.21 Class C and Class H. Ask us about the world's largest ERW mill producing Jumbo HSS up to 22 in. square with 1 in. thick wall in Blytheville, Ark. Atlas Tube is a division of Zekelman Industries.

Automated Layout Technology, LLC

booth 221

Hudson, N.H.

ph: 603.402.3055

www.automatedlayout.com

Automated Layout Technology is the maker of the Lightning Rail, the first automated marking machine created specifically for the layout of stairs and hand rails. The Lightning Rail works with DXF files to quickly and accurately print an entire stair stringer or rail in minutes saving hours of labor. The fully automated CNC machine takes your design and prints the entire work piece on a rigid steel frame table in any configuration including rails, pickets, hangers, and more. Easily place channels on the table for the automatic layout of stair stringers.



AZZ Metal Coatings

booth 1328

Fort Worth, Texas

ph: 817.810.0095

www.azz.com

AZZ Metal Coatings, a division of AZZ Incorporated, headquartered in Fort Worth, Texas, owns and operates 40 hot dip galvanizing plants strategically located across the U.S. and Canada. With kettles ranging from 16 ft to 62 ft in length, we can easily handle a wide variety of material sizes. With our network of plants we are able to accommodate the largest projects with customized turnaround time at a competitive price.

Baco Enterprises, Inc.

booth 1139

Bronx, N.Y.

ph: 718.589.6225

www.bacoent.com

Baco Enterprises Inc. stands proudly as the only bolt manufacturer in NYC. The premier supplier of high quality structural bolts, fasteners, and related materials that bring structures to life. We also supply steel shapes, threaded rod and anchor bolts, misc. steel fabrication, safety, and related products.

Bamal Fastener Corporation

booth 1740

www.bamal.com

Be Pro Be Proud

booth 2621

www.beprobeproud.org

Beamcut Systems/Machitech Automation

booth 326

St-Marc-des-Carrieres, Quebec

Canada

toll free: 833.232.6288

www.beamcut.com

Beamcut Systems: Automate your structural steel fabrication and eliminate costly mistakes with BeamCut, an industry-leading robotic plasma cutting system that integrates advanced FANUC robotics and easy-to-use 3D simulation software with Hypertherm's XPR300 plasma systems. Machitech Automation: For over 15 years, Machitech has offered fully customizable cutting systems of the highest quality, meeting the diverse needs of our clients. From plasma tables to oxyfuel, drilling, pipe cutting, waterjet and more, you can find a solution for your metal cutting needs backed by the best support in the industry.

Bendmak USA

booth 545

Lithia, Fla.

ph: 833.236.3625

www.bendmakusa.com

BendmakUSA specializes in providing advanced drilling and cutting solutions for the metal fabrication industry. They offer a range of products including CNC Beam drill lines, plate and structural bending, and sawing machines. BendmakUSA is known for its high-performance, high-precision, and cost-effective solutions that can increase productivity and reduce labor costs in the structural fabrication industry. They have a reputation for providing excellent customer service and technical support. Their goal is to help metal fabrication companies improve their efficiency, quality, and profitability.

Bend-Tech

booth 214

Osceola, Wis.

ph: 651.257.8715

www.bend-tech.com

Bend-Tech products are at the forefront of designing and fabricating tube and pipe. The Bend-Tech Dragon is the essential production machine for any company that produces hand-rail or other miscellaneous metals. The Dragon

accurately and efficiently plasma cuts round, square, rectangle, angle, and channel tubing. The Bend-Tech Dragon also accurately marks bend locations/rotations and part numbers. With over 27,000 customers, Bend-Tech software has reduced production time and material waste for companies since 2001.

Bentley Systems, Inc.

booth 1519

Exton, Pa.

ph: 610.458.5000 | toll free: 800.BENTLEY

www.bentley.com

Bentley Systems (Nasdaq: BSY) is the infrastructure engineering software company. We provide innovative software to advance the world's infrastructure—sustaining both the global economy and environment. Our industry-leading software solutions are used by professionals and organizations of every size, for the design, construction, and operations of roads and bridges, rail and transit, water and wastewater, public works and utilities, buildings and campuses, mining, and industrial facilities. Bentley Systems employs more than 4,500 colleagues in 186 countries.

Birch Hill, LLC

booth 1229

The Woodlands, Texas

ph: 832.680.5525

birchhillco.com

Samara™ is our new cloud based library of nearly 30,000 structural steel connections. If your connection isn't in our library, it will be within minutes (not days or weeks). Use our tool to quickly identify efficient engineered connection options, which are supported by comprehensive calculations. We are delegated design engineers, and we've developed our software for professional engineers and detailers to make steel connection design and compliance easy. Request a demonstration today!

Birmingham Fastener

booth 2413

Birmingham, Ala.

ph: 205.595.3511 | toll free: 800.695.3511

www.bhamfast.com

Birmingham Fastener, Inc. is a full-line distributor of structural fasteners for the domestic and international markets. We are proud to be the largest distributor of A325 and A490 bolts in the nation and offer fast turnaround to our customers. With manufacturing facilities in Birmingham, Ala., Lavonia, Ga., Houston, Santa Fe Springs, Calif., and Katy, Texas, we can provide you with non-standard structural bolting and any type of welded assembly, threaded rod, or bent anchor bolt you may need.

Birmingham Rail & Locomotive

booth 1820

Moon Township, Pa.

ph: 205.424.7245 | toll free: 800.241.2260

www.birminghamrail.com

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

Blair Corporation booth 2009

Oak Ridge North, Texas
ph: 832.928.9655
www.blairwirerope.com

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

BLM GROUP booth 1031

ph: 248.560.0080
www.blimgroup.com

BLM GROUP is a global leader in tube and sheet metal processing solutions. Our product line includes laser tube cutting, cold sawing, bending, end-forming, end-machining, and wire bending machines. We have more than 60 years of experience and thousands of applications in the development of tube and sheet metal fabrication equipment.

Bluebeam, Inc. booth 1120

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

Trusted by over 2.5 million individuals in more than 165 countries, Bluebeam's smart, intuitive solutions advance the way building professionals work, manage and collaborate on projects digitally. Founded in 2002 in Pasadena, Calif., Bluebeam has grown to include additional offices in California, Texas, Illinois, Germany, England, Denmark, Sweden, and Australia. Bluebeam is part of the Nemetschek Group. Download a free 30-day trial on our website.

Bristol Machine Co. booth 1947

Ontario, Calif.
bristolmachinecompany.com

Bristol Machine Co.: the cutting, threading and hot forging experts. Services include: construction fastener and industrial products; fabrication (anchor bolts, single/double-end rods, U bolts, full thread rod, clevis assembly, hex bolt modifications); grades: F1554-36, 55, 105, A193-B7, A354-BD, and A449. Distributed product: TC bolts domestic/import; tone shear wrenches; Simpson Strong Tie, ITW Red Head, Black & Decker/Powers; concrete anchors; drill bits; assorted grade of bolts, screws, nuts, and washers; all thread rod domestic/import F1554-36, 55, and 105.

Brown Strauss Steel booth 1539

Aurora, Colo.
ph: 303.371.2200 | toll free: 800.274.0359
www.brownstrauss.com
Steel service center.

Bryzos booth 2226

Saint Louis
ph: 844.427.9967
www.bryzos.com

Bryzos is the online steel marketplace for steel professionals, designed and built by industry veterans who understand how steel is bought and sold. Bryzos facilitates the trade of steel between buyers and sellers via its real-time steel negotiating platform. Our objective is to put buyers in direct contact with the manufacturer or supplier that stocks the required material. Bryzos rewards the stakeholders for each transaction.

BuiltUp Engineering Pvt. Ltd. booth 2404

Panaji, Goa
India
www.builtupengineering.co.in

We are a structural steel detailing company based in Goa, India; we are specialized in 3D Tekla modelling and preparation of shop and erection drawings in the field of oil and gas, petrochemical, power generation, mining, and all sort of industrial sectors.

Bull Moose Tube Company booth 2014

Chesterfield, Mo.
ph: 636.537.2600 | toll free: 800.325.4467
www.bullmoosetube.com

Bull Moose Tube produces Hollow Structural Sections (HSS) ranging from 1 in. – 14 in. square (and rectangular equivalents) up to 0.75 in., creating value for a wide-range of applications. As one of North America's largest HSS producers, we're able to offer products that meet a variety of specifications including ASTM A500, A847, A1076, A1085, A1110, A1112 (up to 110 KSI), CSA G40, and EN 10219.

CADeploy, Inc. booth 1106

Danville, Calif.
ph: 408.375.9200 | toll free: 855.444.9497
www.cadeploy.com

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

CAMBICO, Inc. booth 1130

www.cambcoinc.com

Canam Group booth 1336

Boucherville, Quebec
Canada
ph: 866.466.8769
www.canam-construction.com

Since 1961, Canam has been your long-term partner for the design, manufacturing and erection of steel structures in North America. We are here to help you make the best decisions from the very beginning and all throughout the delivery of your project. In addition to our high quality steel joists and deck products, we provide a structural steel package including the design, in-house fabrication, jobsite delivery, and erection of your building structure.

Carboline booth 2229

St. Louis
ph: 314.644.1000
www.carboline.com

Carboline is a St. Louis-based coatings manufacturer with a global reach. The company, founded in 1947, produces high-quality performance coatings, linings, and fireproofing products in more than 20 manufacturing facilities around the world. Carboline's cutting-edge research and development center is a reflection of its commitment to remaining at the forefront of the protective coatings industry.

Cascade Nut and Bolt Company booth 1734

Salem, Ore.
toll free: 888.511.1005
www.cascadenutandbolt.com

Structural and anchor bolts, weld studs, and full machining capabilities.

Cast Connex Corporation booth 1901

New York
ph: 416.806.3521 | toll free: 888.681.8786
www.castconnex.com

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

C-BEAMS booth 2042

Charlotte, N.C.
ph: 704.970.1027
www.c-beams.com

C-BEAMS, established since 2016, markets and manufactures innovative structural solutions from their initial concept to final project delivery. We engage in marketing, design assistance, product manufacturing, and project management services. While the brand is current, our team and products have over 25 years experience at delivering deeper, lighter, short and long span structural solutions used in all types of construction. Made in America, our production of cellular and castellated beams and other welded products are manufactured by AISC certified fabricators and supported by AISC Design Guide 31.

Cerbaco, Ltd. booth 1027

www.cerbaco.com

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Companies written in orange are part of the Bridge Pavilion.

Chapel Steel

booth 500

Lower Gwynedd, Pa.

www.chapelsteel.com

At Chapel Steel we specialize in the wholesale distribution and processing of structural, carbon, and alloy steel plate. As a subsidiary of Reliance Steel & Aluminum Co. (NYSE: RS) we are optimally positioned to provide the highest quality products and services. With over 50 years of industry leading experience you can rely on Chapel Steel to provide effective solutions for all of your business demands. We take pride in our ability to understand our customer's needs and provide a unique level of service by employing the best people in the business.

Chicago Clamp Company

booth 2127

Broadview, Ill.

ph: 708.343.8311

www.chicagoclampcompany.com

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

Chicago Metal Rolled Products

booth 1221

Chicago

ph: 773.523.5757 | **toll free:** 800.798.4504

www.cmrp.com

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

Cleveland City Forge

booth 1529

Wellington, Ohio

ph: 440.647.5400 | **toll free:** 800.431.4350

www.clevelandcityforge.com

Cleveland City Forge, an innovative American manufacturing and engineering company, combines product development with production to produce standard and custom structural steel components that include forging, machining, and distribution. Along with custom components, standard products include: clevises, Clevis pins and recessed pins, turnbuckles, turnbuckles with fittings, threaded rods, rod ends, EyeNuts, EyeBolts, yokes, swage: sockets, sleeves, buttons and studs, and heavy hex nuts. Our products can also be grouped to create complete assemblies ready for installation.

Cleveland Punch & Die Co.

booth 1023

Ravenna, Ohio

ph: 330.296.4342 | **toll free:** 800.451.4342

www.clevelandpunch.com

Cleveland Punch & Die Company is the world leader in manufacturing punches, dies, and shear blades in the steel industry. All of our products are proudly manufactured in the U.S. Original equipment manufacturers continue to trust and recommend our products to meet and surpass our customers expectations for all steel applications. Our customers continue to trust and rely on the most experienced and friendly engineering and customer service support team in the industry. We are proud of our 141 Years of quality, experience, and tradition. Customer service hours: 7:00 a.m. – 6:00 p.m. EDT; sales@clevelandpunch

Color Works Painting, Inc.

booth 2419

New Castle, Del.

ph: 302.324.8411

www.ColorWorksPainting.com

Color Works Painting, Inc. is an SSPC-QP3 shop with a climate control facility. Celebrating 30 years of experience and knowledge in blasting and high-performance coatings (duplex systems, AESS 4-6/C and glass bead)! Capabilities to handle massive structures (bridges, vessels, cranes, DOT). What's more, they staff AMPP Level 3 QC inspectors, guaranteeing your project meets specifications. Impeccable safety record—receiving over 10 consecutive National Pinnacle Awards! No downtime keeps projects progressing with ease. Moreover, CWP offers their own fleet delivery services and access to nearby port and rail services.

Columbia Safety and Supply

booth 2210

Columbia, Mo.

ph: 800.969.5035

www.colsafety.com

Columbia Safety and Supply is North America's premier outfitter of safety gear, contractor equipment, and supplies. We are fall protection experts and we're here to help you find exactly what you need to be safe and productive. Our gear experts combine industry knowledge with professional experience. We service a variety of industries, including steel erection and fabrication, verticle concrete, building enclosure, road and bridge, and more. We carry thousands of products from the world's best manufacturers. Be Safe, Do More, with Columbia Safety and Supply!

Combilift

booth 637

Greensboro, N.C.

ph: 336.378.8884 | **toll free:** 877.266.2456

www.combilift.com

As a specialist forklift and straddle carrier manufacturer, Combilift produces a wide range of customized handling solutions, all of which are designed for the safe, space saving and very productive handling of the long and bulky loads like those handled in the steel industry. The 4-directional Combilifts work as counterbalance,

sideloader, and narrow-aisle forklifts, with the Combi-SC (Straddle Carrier) being the cost effective solution for the handling of containers and oversized loads. Capacities across the Combilift range are from 3,200 lbs. to 180,000 lbs.

COMSLAB

booth 1227

www.comslab-usa.com

Con-Serv, Inc.

booth 2037

www.con-servinc.com

Consolidated Pipe & Supply Company

booth 2004

Birmingham, Ala.

ph: 205.323.7261 | **toll free:** 800.467.7261

www.consolidatedpipe.com

Our Piling and Structural Division offers a complete inventory of carbon steel structural pipe, H-Pile, sheet pile, and piling accessories. We also offer piling fabrication at our yards and a full line of coating services from our in house coating plant. We pride ourselves on understanding and servicing our customer's needs on time and at competitive prices. Consolidated Pipe & Supply has several divisions including: structural/piling, line pipe, utilities, industrial, and nuclear. Please visit our website or contact us for more information on our products and services.

Consteel Solutions, Ltd.

booth 2402

Kecksemét, Bács-Kiskun

Hungary

ph: 36.70.199.8057

www.consteelsoftware.com

ConSteel Solutions Ltd. is a software developer company specialized in structural analysis and design for steel, composite structures with more than 20 years of experience. The mission behind all developments of Consteel is the overall reform of the process of structural design. Our motto is "Truly calculate your structures." Consteel has implemented a brand new approach for the stability and buckling verifications of steel structures made of slender members, which is now brought to the AISC environment.

Controlled Automation, Inc.

booth 1026

Bryant, Ark.

ph: 557.557.5109

www.controlledautomation.com

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

exhibitors

Copper State Bolt & Nut Co.

booth 2010

Phoenix

ph: 602.272.2384 | toll free: 800.603.6887

www.copperstate.com

Copper State supports steel fabrication industries by manufacturing and supplying large-diameter fasteners on-hand in Phoenix, Denver, Reno, and Utah. We offer everything from structural fasteners, hex bolts, anchor bolts, A325 and A490 bolts, and other manufactured specials, both domestic and imported. Value added services include sequencing solutions and logistics, kitting and assembly, product labeling and identification, and VMI. Our manufacturing facility is certified to ISO 9001:2015, with an in-house A2LA accredited quality lab. We support steel fabrication projects throughout the U.S. and internationally.

CoreBrace

booth 1502

West Jordan, Utah

ph: 801.280.0701

www.corebrace.com

CoreBrace buckling-restrained braces (BRBs) are a cost-effective solution to improve the seismic performance of structures. This highly ductile system has been used in thousands of projects worldwide for earthquake risk mitigation. CoreBrace's expert staff works closely with owners, architects, engineers, fabricators, and erectors to meet their design and construction requirements and is committed to providing braces to the highest level of quality. Our extensive research program focuses on sustainable and resilient designs of structures in high seismic zones.



CSC – Canam Steel Corporation

booth 1526

Point of Rocks, Md.

ph: 301.874.5141 | toll free: 800.638.4293

cscsteelusa.com

Canam Steel Corporation (CSC) is a service oriented manufacturer of open web steel joists and steel deck that services the entire U.S. via our six manufacturing facilities. We are a company that prioritizes safety and efficiency of the entire process for both our employees and our customers. We believe in the power of partnerships and the need for flexibility throughout the process for all of our partners. Our projects range from the small retail store at a local strip mall to some of the largest distribution centers, high-rises, schools, and stadiums. We are a participating member of both the SJI and SDI.

Cutting Edge Steel & Stair

booth 2236

Dacono, Colo.

ph: 303.651.3180

cesteel.com

At Cutting Edge Steel, we have the knowledge and expertise to provide an affordable solution to all of your project stair and rail needs. We are your one-stop solution. Our specialty includes work across North America of architectural, commercial service and industrial class stair and rail products. CES offers "pre-engineered" systems when applicable, or can work with clients 62 | APRIL 2023

who envision a one off product for true uniqueness of ornamental design. Depending on scope and location, CES can also provide complete miscellaneous steel packages. Please call to discuss the needs of your next project.

CWB Group

booth 1918

Milton, Ontario
Canada

ph: 800.844.6790

www.cwbgroup.org

CWB Group is an Ontario, Canada-based, industry-supported private sector not-for-profit organization that provides comprehensive, integrated services to nearly 10,000 companies and 100,000 professionals across the welding and joining industry in nearly 50 countries worldwide. EWI provides industrial manufacturers with advanced engineering services in materials joining, forming, testing, and modelling to create effective solutions in product design, fabrication, and production. The organization is based in Columbus, Ohio, and Buffalo, N.Y. Visit us at <https://ewi.org>.

CYPE Software

booth 135

Alicante, Comunidad Valenciana
Spain

www.cype.es

CYPE is a firm that develops and distributes technical software for architecture, engineering, and construction professionals. CYPE's journey began in 1983 and it occupies a leading position within the sector, offering a variety of programs that stand out due to the wide range of casuistry that is dealt with, the reliability of the results and the ease with which they can be managed, with over 120,000 users spread across Europe, America, Africa, Oceania, and Asia. Amongst our clients are town councils and ministries, as well as technical control organisations, universities, and professional offices.

D.S. Brown

booth 1732

North Baltimore, Ohio

ph: 419.257.3561

dsbrown.com

Founded in 1890, The D.S. Brown Company is a leading worldwide designer, supplier, and manufacturer of engineered products for the bridge, airport and highway industries. As technology has evolved and influenced our means of transportation, D.S. Brown too has evolved to meet the needs of the current times. From our humble beginnings in manufacturing horse collars and saddles to our current focus on the manufacturing of high-quality infrastructure construction products under Gibraltar Industries, D.S. Brown has been there for over a century to help the world move forward.

DACS, Inc.

booth 1628

Portsmouth, Va.

ph: 757.393.0704

www.dacsinc.com

DACS, Inc., with a plant strategically located in Portsmouth, Va., manufactures roof and floor decking. Since 1987, DACS has been providing the construction industry with affordable products and quality services. Our continued growth is fueled by loyal customers and

innovative products. With a full line of roof products, including deep decks and cellular decks, as well as composite and non-composite floor decks, DACS is sure to satisfy all your decking needs. Please note we also offer our products in carbon steel, stainless steel and aluminum!

Daito Seiki Co., Ltd.

booth 426

Elk Grove Village, Ill.

ph: 847.437.6788

www.daitousa.com

Daito is focused on metal cutting, drilling, and plasma cutting machines and has become the most technologically advanced machine producer in its field. Along with being the world's top manufacturer in its field, Daito is geared toward customer satisfaction by supporting our customers with our knowledgeable and responsive sales, applications, and our sales personnel.

Dale Fastener Supply

booth 2217

www.dalecompany.com

Danny's Construction Company, LLC

booth 2029

Shakopee, Minn.

ph: 952.445.4143

www.dannysconstruction.com

Since 1970, Danny's Construction Company has been an industry leader in complex and schedule-demanding steel erection projects. We have substantial experience in building bridges, sports and events facilities, hospital and medical facilities, as well as a variety of industrial and commercial structures. With this experience, we have built a reputation for surpassing rugged industry standards for quality, safety, and productivity. Strategic office locations across the country provide us the resources available to take on projects regardless of size, location, complexity, or demanding scheduling parameters.



DAVI, Inc.

booth 1132

Dallas

ph: 972.661.0288 | toll free: 888.282.3284

www.davi.com

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

DBM VirCon

booth 1909

Tempe, Ariz.

ph: 480.615.1700

www.dbmvircon.com

We make design constructible. DBM VirCon is a premier construction modeling, detailing, and digital engineering company. With our vast experience, we help our market leader customers including owners, engineers, EPCM firms, general contractors and fabricators build with confidence across the globe. Our proven methods and preconstruction collaboration platforms help our clients compress schedules and mitigate cost overruns by proving the design constructible and complete.

Delta Steel, Inc.

booth 1006

Houston

ph: 713.635.1200 | toll free: 800.324.0220

www.deltasteel.com

Delta Steel, Inc. is a customer oriented company, striving to build long lasting and mutually profitable customer relationships. We are committed to continuous improvement in our service, in our products, in safety and in our personnel. We emphasize professional and ethical business dealings with customers, suppliers, and employees. Formed in 1963, Delta Steel is a subsidiary of Reliance Steel & Aluminum Co. Delta Steel is one of the largest steel service centers in the southwest U.S. serving industrial, commercial, and OEM markets.



DGS Technical Services, Inc.

booth 2032

Elgin, Ill.

ph: 630.539.8200 x5204

toll free: 630.539.8200 x5202

www.dgsts.com

DGS group company is a customer centric and performance-based organization providing end-to-end solutions in engineering, design, and structural domains, based out of Elgin, Ill. We have presence with offices in the U.S., Canada, UK, and UAE. We have certified American PE and technical PMs with over 35+ years of experience located in the U.S. We use smart software like Tekla, SDS2. Our production team includes highly skilled and dedicated engineering squads, specialized in structural engineering, steel detailing, bridge detailing, connection design, estimation, and estimodeling.

Dlubal Software, Inc.

booth 1701

Philadelphia

ph: 267.702.2815

www.dlubal.com

Dlubal offers powerful programs for structural and dynamic analysis of multiple materials including steel, concrete, aluminum, timber, CLT, glass, cables, and fabric form-finding per the U.S./International standards. The 3D FEA program RFEM efficiently and accurately performs non-linear analyses of member, plate and solid elements. RFEM is one of the most highly sophisticated yet user-friendly programs especially suitable for new users with its intuitive modeling work flow. Experience why more than 5,000 companies and universities worldwide trust in Dlubal Software.

Dörken Coatings North America

booth 1709

Grass Lake, Mich.

ph: 517.522.4600

www.doerken.com/na

Welcome to DÖRKEN. Our coating solutions and membranes protect the smallest components and entire buildings. Discover our expertise.

DOT Quality Services

booth 1721

www.dotqs.com

DuraFuse Frames

booth 1230

West Jordan, Utah

ph: 801.727.4060

www.durafuseframes.com

How do you design steel moment frames that: 1) meet or exceed all code provisions, 2) are the most economical, and 3) are easily repairable? Full-scale laboratory and shake table testing have demonstrated performance and repairability. Code approvals include AISC 358-22 and IAPMO UES ER 610. DuraFuse Frames engineers, utilize in-house tools to optimize frames for stiffness and weight. If you want a resilient design option that is economical to construct and repairable to ensure quick re-occupancy after a major earthquake, there is no equal. DuraFuse Frames is the resilient seismic solution.



Eastern Pneumatics & Hydraulics, Inc. / McCann Equipment Ltd.

booth 1633

Salem, N.H.

ph: 603.893.7662 | toll free: 800.356.5624

www.ephtools.com

EPH Specializes in steel erector and torque tools such as: Tone, Electric; TorqFusion, pneumatic, electric and battery; Torcup, SPX power team hydraulic wrenches, cylinders, and pumps; Skidmore-Wilhelm bolt tension calibrator; Kabo torque wrenches and torque testers; Klein drift pins up to 1¹/₁₆ in., structural wrenches, and accessories. We operate an ISO 17025:2017 accredited calibration facility for repair, calibration, and certification with NIST traceability. We also have the capability to service virtually any make and model torque tool.

eLogicTech Solutions

booth 2241

www.elogitech.com

EMI

booth 337

Green Lane, Pa.

ph: 610.287.4240 | toll free: 877.445.4292

www.emiworks.com

Electro-Mechanical Integrators, Inc. is a manufacturer of CNC Plasma equipment specializing in miscellaneous metals for the fabrication industry. We have been committed to providing cost-effective solutions through quality machines and unparalleled service for 25 years. Contact us today to see how our machines can save you time and make you money.

Endproc Technical Services, Inc.

booth 1845

Calgary, Alberta

Canada

ph: 587.650.5735

endproc.com

At Endproc we specialize in providing high quality structural steel detailing services to steel fabricators, engineering, and architecture firms across Canada and United States, we are a company you can trust to design and detail your structural steel projects.

ENERCALC

booth 2114

Missoula, Mont.

ph: 949.645.0151 | toll free: 800.424.2252

www.enercalc.com?ref=STL23

ENERCALC is a proven, powerful, widely-used design program consisting of 40+ structural calculation modules, ranging from simple component designs (steel beam, concrete column, etc.) to analysis (i.e., rigid diaphragm torsion), earth retention, and full 3D FEM analysis. ENERCALC's powerful capabilities and simple intuitive interface make it ideal for complete design of small and medium-sized structures, as well as for spot checks, verifications, and design of miscellaneous components on large-scale projects. NEW! Engineers can now create/manage calculations and update Revit models even faster via ENERCALC for Revit.

Enidine

booth 1728

Orchard Park, N.Y.

ph: 716.662.1900 | toll free: 800.852.8508

www.itt-infrastructure.com

Our highly engineered structure protection components and custom solutions are built to take on whatever Mother Nature can dish out. With over 20-plus years of experience, Enidine offers a diversified portfolio of energy absorption products for infrastructure and equipment protection. Enidine offers the fastest service in the industry, the highest quality of testing around and in-house product development. No matter what seismic protection solutions you need, we get the job done.

Ercolina – CML USA, Inc.

booth 1144

Davenport, Iowa

ph: 563.391.7700

ercolina-usa.com

CML USA, Inc. is the North American supplier of Ercolina tube, pipe and profile bending, and metalworking machinery. CML has experienced sales, service, and support staff ready to offer positive application solutions for today's fabricator. Ercolina's affordable tubing benders and fabricating machinery reliably and accurately produce your applications increasing profit and improving product quality and finish.

EVER Seismic, LLC

booth 1231

Sandy, Utah

ph: 385.380.EVER

www.everseismic.com

Not just another buckling-restrained brace manufacturer! These are BRBs with Strain Control Technology and robotic-level precision manufacturing. All-steel, lightweight BRBs that are easier to erect and can downsize your crane. BRBs + next level customer service and connection optimization that you can See. Contact us today for assistance on your next project!

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Exact Detailing

booth 1637

Victoria, British Columbia
Canada

ph: 250.590.5244

www.exactdetailing.com

Exact Detailing is Canada's premier specialist in providing steel detailing, 3D modeling, BIM, and 3D scanning services to the North American steel industry. Our five offices across North America employ high-quality detailers trained in the most recent programs and processes to provide the best AISC and CISC compliant shop drawings on all varieties of steel projects. Need services beyond steel detailing? Ask us about our project management/coordination, connection design, data management, and surveying services. We pride ourselves the quality of our work and look forward to working with you!

Fabreeka International, Inc.

booth 1726

ph: 781.341.3655 | toll free: 800.322.7352
Stoughton, Mass.

www.fabreeka.com

Fabreeka values our working relationships with structural steel designers and builders. Known for over 100 years to provide exceptional engineering knowledge, first-class customer service, and high-quality products which include pre-formed fabric and random oriented fiber pads, slide bearings, and thermal breaks. Our team recommends effective solutions for reducing structure-borne noise, thermal bridging, and vibration for buildings, bridges, rail track, piping, machinery, and more. Let's talk about your next project!



Fabricators & Manufacturers Association

booth 601

fmanet.org

FabStation by Eterio Realities

booth 846

Colwood, British Columbia
Canada

toll free: 866.979.0453

fabstn.com

Eterio Realities is a software company, started by fabricators, focused on building production software for the fabrication floor. Our product, FabStation-STEEL, is a cloud based software suite that focuses on providing digital augmented reality tools that will help steel fabricators visualize and complete their work in a more efficient and accurate manner. Check out our product video or visit our website and see the future of production using the Microsoft HoloLens 2 with FabStation.

Fabsystems, Inc.

booth 1821

fabsystemsinc.com

FATZER AG

booth 1743

Romanshorn, Thurgau
Switzerland

ph: 41.71.466.8111

www.fatzer.com

Founded as a rope-making factory in 1836 in the Swiss town of Romanshorn, FATZER has been producing top-quality ropes for generations. Nowadays, FATZER specializes in the development, manufacture and global distribution of high-quality steel wire ropes for ropeways, winches, structural applications, and other applications.

Fenagh Engineering & Testing

booth 2110

Natick, Mass.

ph: 925.403.4747

www.fenaghenengineering.com

Fenagh Engineering and Testing was formed in 2014 as a response to meet clients' universal need for a responsive engineering and inspection consultant. Fenagh's dedicated steel division can support a variety of services throughout the nation and internationally including but not limited to: ASNT level III oversight, welding procedure review, visual inspection, non-destructive (UT, MT, PT, VT), metallurgical testing, AWS certified welding inspection, CWB certified welding inspection, quality control/quality assurance, shop audits, welder qualification, ICC structural welding, ICC structural steel and bolting, and MagnaStress.

FICEP Corporation

booth 618

Forest Hill, Md.

ph: 410.588.5800

www.ficepcorp.com

FICEP Corporation is currently the largest manufacturer of structural steel and plate fabrication systems and software. FICEP offers over 150 different CNC systems to achieve the optimum solution to any specific fabricators application. In addition to the different CNC work centers, FICEP totally integrates custom designed material handling systems for Intelligent Steel Fabrication without the requirement for multiple operator involvement.

Fickett Structural Solutions

booth 1846

Middleton, Wis.

ph: 608.831.3238

www.fickettinc.com

Since 2001, Fickett Structural Solutions has served public and private clients in the A/E/C Industry in the building, transportation, and infrastructure markets by providing structural inspections and evaluations, nondestructive testing, steel fabrication quality assurance inspections, welding and fabrication consultation, and technical training. Our projects range from large civil infrastructure, such as bridges and locks and dams, to major commercial, industrial, and institutional buildings, parking structures, stadiums, arenas, and ancillary support structures for lighting and signage.

Fontana Fasteners, Inc.

booth 1707

Frankfort, Ind.

www.acument.com

Fontana Fasteners, Inc., a Fontana Gruppo company, produces LE USA® fasteners and provides customers with high-quality cold-formed fasteners produced from steel melted and rolled exclusively in the U.S. In fact, Fontana Fasteners, Inc. is the only North American full-service manufacturer and provider of structural bolts, nuts, washers, and TC assemblies.

GEKA USA

booth 746

Abingdon, Md.

ph: 410.319.2900 | toll free: 443.955.1007

www.gekausa.com

CNC lines and solutions for steel and metal working: Geka's tailor-made CNC solutions and lines for all your CNC steel and metal working manufacturing needs. Geka offers a range of categories of CNC solutions and CNC machinery for different ironworking tasks. These include ironworkers, CNC positioners and feeders, CNC solutions for drilling, and CNC solutions for punching; angles processing CNC Punching Solutions (GAMMA Series); flat bars processing CNC Punching Solutions (ALFA series); and beams processing CNC drilling solutions (SIGMA).

GERB Vibration Control Systems

booth 1819

Lisle, Ill.

ph: 630.724.1660 | toll free: 888.454.GERB

www.gerb.com

With a company history of over 100 years, GERB is dedicated to vibration and seismic control of buildings, tall structures, rail trackbeds and large machinery (e.g. emergency generators etc.). GERB Tuned Mass Dampers (TMDs) in particular are used worldwide for the vibration control of pedestrian and wind induced vibration of long-span and slender structures (e.g. floors, bridges, skyscrapers, etc.). GERB systems are based on well-established physical principals using elastic elements and the VISCODAMPER, a viscous fluid dashpot/damper that is frictionless and can work at very low amplitudes.

Gerdau

booth 1926

Tampa, Fla.

ph: 800.367.8144 | toll free: 800.237.0230

www.gerdau.com

Gerdau Long Steel North America (GLN) manufactures merchant bar, structural steel, piling, special bar quality and rebar products for the agricultural, automotive, civil construction, distribution, energy, industrial, and mining markets. GLN operates six mills in the United States and three in Canada, and is a wholly owned subsidiary of Gerdau S.A.

Girder Slab Technologies

booth 1943

www.girder-slab.com

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the Bridge Pavilion.

GIZA

booth 1518

St. Louis

ph: 314.656.4615

www.gizasteel.com

GIZA is a connection design software that covers more than 400 different connection types in the shear, moment, vertical brace, horizontal brace, and splice categories. Compliant to AISC 14th and 15th *Manual* edition—ASD and LRFD methods, GIZA provides a comprehensive set of calculations with references to all applied codes. We offer integration with Tekla Structures and Tekla Structural Designer, but can also be used as a standalone option. GIZA has been in use for over 10 years and has successfully designed thousands of connections on thousands of projects over that time. Try it yourself free for 15 days!

Grating Fasteners

booth 2202

Harvey, La.

ph: 504.361.3471 | toll free: 800.227.9013

www.gclips.com

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

Greenbrook Engineering Services

booth 1836

Middlesex, N.J.

ph: 732.412.8000

www.greenbrookengineering.com

Our philosophy: Focus on quality, deliver on time. Greenbrook Engineering is an MBE certified company specializing in structural steel, miscellaneous steel and rebar detailing, 3D modeling, connection design, and BIM coordination services for the steel industry. With offices in Phoenix and New Jersey, and production centers in Bangalore and Chennai, India, we serve structural designers, steel fabricators, and architects. We have in-house engineering capabilities to design and stamp connections for every state in the U.S. and Canada.

GRM Custom Products

booth 1618

Conroe, Texas

ph: 936.441.5910

www.grmcp.com

For over 60 years, GRM Custom Products has worked with engineers, steel fabricators, and contractors to provide customized high-quality products. The exclusive fabricator of Fluorogold Slide Plates in North America, we manufacture to meet your project's exacting specifications and expedited timeline, providing consistent deliveries. We have also grown our custom offerings to better support our clients. At GRM, you can now find a full line of FRP pads and structures, as well as laminated thermal breaks to cotton duck and rubber pads. Please contact us so we can put our experience and expertise to work for you.

GWY, LLC

booth 1508

Greenfield, N.H.

ph: 603.547.3800 | toll free: 888.838.6500

www.gwyinc.com

GWY has been a global leader in bolt fastening tools since 1975. Our Turn of Nut series of wrenches are custom-designed in partnership with the global leader in electric tool companies, Tone. Using our years of experience in bolt fastening with Tone's years of quality wrench manufacturing, we have created a wrench that meets the high standards of the federal government for structural fastening. Our other line of tools include the popular TC wrenches for shear bolts, and our torque wrenches for snug tightening, calibration, and other duties. We also offer repair services, rentals, parts, and calibration.

Harbor Fab

booth 2006

Fort Worth, Texas

ph: 682.350.3550

www.harborfab.com

Since 1972 we have served industrial and commercial markets with miscellaneous metal fabrications. Harbor Fab now offers pre-engineered stairs, rails, ladders and platforms nationwide in addition to our custom designed products.

Haydon Bolts, Inc.

booth 1426

www.haydonbolts.com

Helluva Container, Inc.

booth 2422

Elk Point, S.D.

ph: 605.356.2232 | toll free: 877.745.0311

www.helluva.com

Helluva Container specializes in high quality new and used Gaylord boxes/bins/totes, FIBC bulk bags, liners, films, tapes and pallets. With distribution centers across the U.S., we always have inventory ready to go. Because every penny counts. More importantly, our people are devoted to making your life easier—by taking bulk container logistics off your plate. We also purchase used Gaylord boxes. Be your company's hero and partner with us in the endless quest for sustainability solutions! We're not Kinduva, Gooduva or Okayuva. We're Helluva. There is a difference.

Hercules Bolt Company

booth 1826

www.herculesbolt.com

HEXAGON

booth 1444

hexagonppm.com

Hilti, Inc.

booth 2020

Plano, Texas

toll free: 800.879.8000

www.hilti.com

Hilti is a world-leading manufacturer and supplier of quality, innovative and specialized tools and fastening systems for the professional user. With more than 1,350 highly trained Hilti account managers and engineers throughout North America and an additional 1,100 Hilti employees

nationwide, Hilti expertise covers the areas of powder actuated fastening, drilling and demolition, diamond coring and cutting, measuring, fire-stopping, screw fastening, adhesive and mechanical anchoring, and strut and hanger systems.

HI-Q Design, Inc.

booth 2102

Mesa, Ariz.

ph: 347.615.6505

www.hiqdesigninc.com

HI-Q is a global structural steel and mechanical design and detailing company established in 2004. We have teams of qualified and experienced engineers and detailers, who specialize in structural steel design and detailing, connection design, mechanical design, and piping design. We have completed small, medium, and large sized projects for our international customers in all the continents of the world. HI-Q has the capability to produce complicated 2D and 3D models for structural and mechanical design and to generate fabrication and erection drawings, which are accepted by steel fabricators and erectors.

HK Laser & Systems

booth 946

ph: 630.916.0200

www.hk-us.com

HK America, Inc. is the North American subsidiary of HK CO. Our 25,000 sq. ft technical and demo center is located in Chicago, where the latest HK products are displayed for demonstration. The service parts inventory room stores plenty of parts to support all of North America providing same day shipping. We have additional service centers located in Charlotte, N.C. and Brea, Calif. Over 15 sales networks and over 400 laser machines installed at customer sites throughout the United States, Canada, and Mexico and a well-established quick-response service system.

Holloway Houston, Inc.

booth 1017

Houston

www.hhilifting.com

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

HRV Conformance Verification Associates, Inc.

booth 1745

Moon Township, Pa.

ph: 412.299.2000

www.hrvinc.com

Leading experts in materials QA/QC inspection, coatings inspection, NDT, and CM/CI focused on transportation, rail and transit, oil and gas, power, commercial, and water/wastewater markets, with the capacity to provide AWS CWI, NACE, SSPC, ACI, PCI, and API inspections in materials fabrication plants and on project sites. We excel by maintaining high standards of technical training, leveraging deep industry knowledge and experience, practicing ethical conduct, applying innovative technologies, and communicating openly with our clients. We are Quality. Assured.

HYTORC

booth 1704

Mahwah, N.J.

ph: 201.512.9500

www.hytorc.com

HYTORC makes industrial bolting safer and simpler. With over 50 years of experience focused entirely on developing the highest quality industrial bolting systems, HYTORC is the most trusted name in the industry. From steel mills and mining equipment to refineries, power plants, and wind turbines; we have developed solutions for every bolting application imaginable. For custom projects, our highly experienced engineering team is at your service to design the most efficient solution for your job with simple operation and economical pricing in mind.

IAPMO Uniform Evaluation Service

booth 1806

Ontario, Calif.

ph: 909.472.4100 | toll free: 877.443.7778

www.uniform-es.org

IAPMO Uniform Evaluation Services (UES) provides summary reports specifically for the steel industry. These documents demonstrate product/material/system/design compliance to applicable codes and standards, expediting approvals within the building industry. Current steel-related activities include steel deck, steel wall, and roof cladding, structural steel members, cold-formed steel framing, steel connectors, steel fasteners, and fabrication. We offer true turnkey service from product testing by IBT, to uniform evaluation reports, through ongoing manufacturing audits from quality control consultants.

IDEA StatiCa US LLC

booth 1636

Mount Laurel, N.J.

ph: 856.642.4070

www.ideastatica.com

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

IES, Inc.

booth 1822

Bozeman, Mont.

ph: 406.586.8988

toll free: 800.707.0816

www.iesweb.com

For over 25 years, Integrated Engineering Software (IES) has been developing user-friendly structural software that helps you efficiently solve a wide range of real-world problems. While our most versatile product, VisualAnalysis, can be used to analyze and design almost any three-dimensional structure, we also offer a variety of task-specific programs: ShapeBuilder, VisualFoundation, ConcreteBending, ConcreteSection, VACONnect, and more. Discover why thousands of engineers worldwide depend on Integrated Engineering Software.



IKG

booth 1837

Houston

ph: 281.452.0709 | toll free: 800.324.8417

www.ikg.com

With over 100 years of experience, IKG® continues to lead the bar grating industry with high-quality products, unmatched expertise, and innovative solutions. Our skilled network of sales personnel and engineering staff provide consultative services and solutions to customers in a wide range of industries. For quick delivery, IKG manufacturers high-quality bar grating with several plants throughout the U.S. and Mexico. Through consistent, competitive, and dependable customer care, Forging Partnerships™ has become synonymous to IKG.

Indiana Group

booth 2128

Mumbai, Maharashtra

India

ph: 91.9820.032.565

www.indianagroup.com

Indiana Gratings Private Limited (IGPL)—INDIA is the flagship company of Indiana Group (www.indianagroup.com). IGPL is an ISO 9001, ISO 14001, and ISO 45001 certified company. IGPL is one of the largest fabricators of gratings in the world and has established an impeccable reputation and carved a permanent niche with clients in India and abroad. IGPL has an installed capacity to produce 250 MT bar gratings panels per day. Since 2002 IGPL is regularly supplying grating panels to various steel service centers in the U.S.

Infasco

booth 1733

www.infasco.com

Informed Infrastructure

booth 2412

West Allis, Wis.

ph: 312.771.9818

www.informedinfrastructure.com

Informed Infrastructure is the leading media outlet for civil and structural engineers. We reach 40,000 readers via our magazine, weekly eNewsletter, web site, video content, surveys, and our industry leading continuing education platform.

InfoSight Corporation

booth 1126

Chillicothe, Ohio

ph: 740.642.3600 | toll free: 800.642.3600

www.infosight.com

InfoSight provides durable identification that allows our customers to digitalize their processes through harsh environments. These innovative, cost effective solutions are customized to fit your unique requirements to reduce risk and cost and increase efficiency and safety. Our metal tags, LabeLase® laser printers, and automated marking systems are the most durable identification and traceability solutions on the market. KettleTag®PLUS, ShotTag, PaintTag, and PowderCoat Tag are the go-to laser printed metal barcoded tags used by galvanizers and fabricators.



Infra-Metals Co.

booth 1006

Langhorne, Pa.

ph: 215.741.1000 | toll free: 800.899.3432

www.infra-metals.com

Infra-Metals Co. is one of the largest structural steel service centers in the U.S. We are well-positioned to satisfy your needs in New England, Mid-Atlantic, Midwest, Southwest, and Florida. As a subsidiary of a leading international company, Infra-Metals is provided with secure financing and has a strong commitment to steel distribution and processing. Infra-Metals offers unparalleled service with on-time delivery and a substantial lineup of processing equipment. Anyone can quote a price, Infra-Metals can quote it from stock.



International Design Services, Inc.

booth 1518

St. Louis

ph: 314.872.1791

www.ids-inc.net

IDS is committed to delivering the highest quality of detailing and connection design services. Our over 500 team members, including connection design engineers, detailers, and supporting staff provide ample manpower to support any project type and schedule. Our shop drawings and calculations are produced under the direct supervision of licensed professional engineers. In addition to 3D and BIM models in SDS2 or Tekla, IDS provides NCI, CNC, DXF, DSTV, and other production file formats.

International Zinc Association

booth 2431

www.zinc.org

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

Interstate Gratings

booth 2130

London, Utah

ph: 801.922.4700 | toll free: 888.499.8494

www.interstategratings.com

Interstate Gratings operates in a 120,000 sq. ft fully-integrated manufacturing and fabricating facility, ideally located in the hub of the west. We have a highly experienced in-house detailing and project management team. Our custom automated CAD solutions provide seamless integration with our shop processes and our advanced CRM solution accurately tracks jobs from start to finish. With an expert team of grating professionals, state-of-the-art equipment and integrated technology, Interstate Gratings is prepared to take on jobs of any scope or schedule.

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Ironworkers/IMPACT

booth 2211

Washington

ph: 202.393.1147 | **toll free:** 800.545.4921

www.impact-net.org

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

IRyS Global, Inc.

booth 2107

www.irysglobal.com

ISD Group USA

booth 2201

Cornelius, N.C.

ph: 704.519.2498

www.isdgroup.us

ISD Group is a provider of 2D/3D engineering and design software that offers innovative solutions for the structural engineering sector. With over 45 years of experience in the steel, metal and facade sector, the company is an expert for 2D/3D modeling software with automation to production output and integrated project/drawing management. Conceptualize your ideas at high speed with the extensive solution for engineering.

J. B. Long, Inc.

booth 1029

610) 944-8840

Fleetwood, Pa.

www.jblong.com

Cheap Detailing Ain't Cheap! J.B. Long, Inc. has supplied structural steel and miscellaneous iron detailing to the fabrication industry since 1985.

JD Squared, Inc.

booth 110

Johnson City, Tenn.

ph: 423.979.0309

www.jd2.com

JD Squared is a U.S. manufacturer of metal fabrication tools. We make tube and pipe benders, tube and pipe notchers, CNC cutting tables, and CNC pipe cutters.

JH Botts, LLC

booth 1426

Joliet, Ill.

ph: 815.726.5885 | **toll free:** 800.888.5885

www.jhbotts.com

As specialists in manufacturing anchor bolts from raw material emphasizing ASTM F1554 and ASTM A449 material, we stock many ½ in. to 3½ in. diameter round bars in 20 ft-0 to 40 ft-0 lengths. Additionally, we can manufacture using many different grades of material including ASTM A615 rebar, stainless steel rods and other assorted carbon steel grades. Our ability to produce within the tolerances prescribed by the American National Standards Institute (A.N.S.I.) make us a valuable asset to our customers.

JMT Consultants, Inc.

booth 1019

United States

ph: 204.510.1547

www.jmtconsultants.com

JMT Consultants was founded in 2008 to provide quality and reliable steel and concrete detailing/design services to the construction industry. We are a full service firm that operates with integrity, loyalty and treats each customer how we would want to be treated. These principles have led JMT Consultants to become an award winning, industry leader. We believe in a collaborative, organized and efficient process to complete projects both on schedule and on budget.

Kinetic Cutting Systems, Inc.

booth 936

West Burlington, Iowa

ph: 319.754.5040 | **toll free:** 800.606.2954

www.kineticusa.com

Kinetic manufacturers a variety of precision CNC plasma and flame cutting machinery, as well as multi-process machines that combine machining operations such as drilling, tapping, milling and interpolation with cutting operations. One machine, complete parts, start to finish. Kinetic offers a complete solution for the structural steel industry.

Kobelco Welding of America, Inc.

booth 1902

Stafford, Texas

ph: 281.240.5600

www.kobelcowelding.com

Kobelco, your best partner for structural steel fabrication, including seismic application is proud to be one of the few companies that develops all of its own original welding materials, welding robots, and welding power sources.

Kottler Metal Products, Inc.

booth 1443

Willoughby, Ohio

ph: 440.946.7473 | **toll free:** 800.678.0808

www.kottlermetal.com

Structural steel bending and fabricating specialists. Kottler Metal Products is proud to have one of the largest pipe, tube, and structural steel bending capacities in the Midwest, bending up to 10 in. angle, 20 in. pipe and tube, and 40 in. channel and I-beam, both easy-way and hard-way. Family owned and built on a 100+ year legacy, our business philosophy is based on a dual commitment to quality and service. For five generations we have maintained the tradition of producing the highest caliber of metal fabrications throughout the world.

KTA-Tator

booth 1712

Pittsburgh

ph: 412.788.1300 | **toll free:** 800.245.6379

kta.com

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

and coatings training. KTA also distributes a complete line of field inspection instrumentation.

LAP Laser, LLC

booth 1447

www.lap-laser.com

LARSA, Inc.

booth 1702

Melville, N.Y.

ph: 212.736.4326 | **toll free:** 800.LARSA.01

www.larsa4d.com

LARSA develops advanced 3D finite-element analysis software for bridges. Engineers rely on LARSA as the only software capable of advanced modeling techniques with the essential tools needed to handle complex geometries and elaborate staging. Backed by the industry's most responsive support team, engineers rapidly receive personalized assistance informed by our decades of experience advancing structural analysis software. Visit us to learn why LARSA's Steel Bridge Module leads the way for the design and rating of steel girder bridges at the nation's leading firms and State DOTs.

LeJeune Bolt Company

booth 1603

Burnsville, Minn.

ph: 952.890.7700 | **toll free:** 800.872.2658

www.lejeunebolt.com

LeJeune Bolt is the leading international supplier of structural fasteners and tools as well as your source for the ASTM F3148 TNA fastening system. With the approval of F3148 and the combined method by RCSC and upcoming publication by AISC and AREMA, F3148 TNA bolt assemblies, and torque and angle installation can be specified with confidence. Contact LeJeune Bolt Company to learn more about how our TNA fastening system can provide improved efficiency, quality control, and cost savings for your next project.

Lichtgitter USA

booth 1944

Houston

toll free: 844.548.7911

www.lichtgitterusa.com

Based in Houston, Lichtgitter USA manufactures and fabricates grating products using state of the art technologies. Lichtgitter's production procedures and machinery, many protected by patent, were specially designed for the Lichtgitter production process. Gratings for normal and special loading requirements are produced with highly integrated welding and fabrication processes, and our sales and service departments technical expertise are geared to address each of our customer's specific job needs.

Lincoln Electric Company

booth 1014

Cleveland

ph: 216.481.8100

www.lincolnelectric.com

Lincoln Electric is the world leader in arc welding, robotic welding systems, plasma and oxyfuel cutting equipment and brazing and soldering alloys. Headquartered in Cleveland, Lincoln has a worldwide network of manufacturing, distribution, sales and technical support covering more than 160 countries.

Lindapter

booth 1720

Leander, Texas

ph: 866.566.2658

www.lindapterusa.com

Over 85 years, Lindapter has pioneered the design and manufacture of structural steel clamping systems and HSS blind fasteners, enabling faster steel construction. Products include the Holo-Bolt, the HSS expansion bolt approved by ICC-ES for all seismic design categories (A through F); while the girder clamp is approved for quickly connecting W & S beams. Lindapter connections eliminate the need for time-consuming drilling or welding in the field and reduce time and labor costs.

LNA Solutions

booth 1131

www.lnasolutions.com

LS Industries

booth 900

www.lsindustries.com

LTC, Inc.

booth 1438

Onalaska, Wis.

ph: 608.786.0893

www.ltcsteeldetailers.com

LTC is a leading virtual design and construction (VDC) firm, providing world class preconstruction through project turnover services to architects, engineers, contractors, and fabrication shops across North America. From its founding as a steel detailing company, to its evolution as a BIM solutions provider, to its most recent expansion into VDC, LTC has always put clients first. With continuous investment into software customization and development, LTC's clients receive service and products that are specific to their individual needs, and efficiently produced in a timely manner.

LUSAS

booth 1747

Kingston upon Thames, Surrey
United Kingdom

ph: 646.837.8756 | **toll free:** 800.97.LUSAS

www.lusas.com

LUSAS finite element analysis software provides accurate and cost-effective analysis, design and load rating of steel and concrete bridges. Used widely by consultants and DOTs for frequency, seismic, dynamic, nonlinear, buckling, fatigue, staged construction, creep and shrinkage, prestress/post-tensioning, soil-structure and rail track-structure interaction modeling, and many other forms of analysis. Vehicle-load optimization facilities provides worst-case traffic and rail loading patterns. AASHTO and other design codes supported. Extensive results viewing and reporting options.

Mac-Tech

booth 347

Milwaukee

ph: 414.486.9700

www.mac-tech.com

Our philosophy has remained consistent over the last 39 years: We maintain a relentless obsession to serve our customers. Mac-Tech was founded

in 1984 to service and support metal fabrication equipment. We've been in business for over 39 years and are well-positioned to service and support our customer base throughout North America. At Mac-Tech, we strive to develop long-term partnerships with our customers and leave a positive lasting impression every time.

MAGNA Lifting Products, Inc.

booth 801

Blaine, Wash.

ph: 360.392.0432

www.magnalifting.com

Our high quality, competitively priced product has made us successful across the United States and Canada for over 20 years. Our lever, hand chain, and trolley products are manufactured in South Korea and made of all Korean parts, with high alloy load chain from Japan and Singapore. In addition to our high-quality product MAGNA also prides itself on providing top-notch service and support. Most orders placed with MAGNA are shipped the same day from one of our four strategically placed warehouses. On quote and information requests we aim to respond within minutes, whether it be over the phone or through email.

Magni Group, Inc.

booth 1920

Birmingham, Mich.

ph: 248.647.4500

www.magnicoatings.com

Magni engineers, manufactures, and applies high-performance corrosion protection coatings that extend the service life of their products. Magni serves its global customers from support facilities in the U.S., Brazil, China, France, Germany, India, Japan, and Korea. Magni coatings are applied by a network of more than 200 coating applicators. Our superior chemistry and engineering insight ensure that quality, consistency and shelf life are second to none. In recent years, we've added metal-finishing facilities and technical centers around the world.

Magni Telescopic Handlers

booth 1908

Roselle, N.J.

ph: 908.280.8899 x110

toll free: 833.624.6487

www.MagniTH.com

Magni Telescopic Handlers is the world leader and rotating and heavy lift telehandlers. Eliminate the need to rent a crane! Magni offers 16 rotating models with lift heights from 57–167 ft and lifting capacities from 8,800–28,600 lbs. There are 100 attachments which allow the machine to serve as a telescopic forklift, RT crane, aerial work platform, and more. Magni's are the safest, most productive, and efficient machines in their class. Magni also offers eight heavy lift models with lifting capacities from 22,000–110,000 lbs.

Maruichi Leavitt Pipe and Tube

booth 2108

Chicago

ph: 773.239.7700 | **toll free:** 800.532.8488

www.maruichi-leavitt.com

Maruichi Leavitt Pipe and Tube is an industry leader, operating four tube mills, with one of the

broadest size ranges of structural (ASTM A500) tube, mechanical (ASTM A513) tube, standard pipe (ASTM A53) and automotive (JIS G3445) in the industry.

Matthews Marking Systems

booth 1808

Cranberry Township, Pa.

ph: 800.775.7775

matthewsmarking.com

Matthews Marking Systems is a global supplier of marking and coding solutions for product identification, branding, and traceability. Our customers trust us to help them achieve increased productivity while driving bottom line improvement with reliable systems for any application. With over 170 years of marking and coding experience, we've established a global reputation as a premier innovator helping customers succeed in industrial and consumer goods packaging industries.

Max Weiss Co., LLC

booth 1607

Milwaukee

ph: 414.208.5089 | **toll free:** 888.649.3477

www.maxweiss.com

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

McLaren Engineering Group

booth 2031

www.mgmclaren.com

MDX Software

booth 1542

Columbia, Mo.

ph: 573.446.3221

www.mdxsoftware.com

MDX Software Curved and Straight Steel Bridge Design and Rating is in use by many top design firms and DOTs to design and rate steel girder bridges for compliance with LRFD, LFD, and ASD AASHTO Specifications.

Messer Cutting Systems

booth 145

Menomonee Falls, Wis.

ph: 262.255.5520

www.messer-cutting.com

Messer Cutting Systems is a global supplier of cutting solutions for the metal-working industry. With our reliable cutting innovations and technologies, superior service, and intelligent software solutions, we are setting standards of solutions, services, and support worldwide. As the leader in the thermal cutting industry, we are working on smarter, faster, and more reliable solutions as an added value for our customers. This is what motivates our nearly 1,000 experienced employees in five main locations every day. Messer Cutting Systems is actively supporting our customers in more than 50 countries.

Metals USA

booth 1116

Langhorne, Pa.

ph: 267.580.2100 | **toll free:** 800.523.3340

www.metalsusa.com

Structural fabricators across North America trust and rely on Metals USA for their structural steel requirements. Metals USA is the industry leading source for extensive inventory, and sophisticated processing services including plate burning/drilling, tee splitting, cambering and press brake forming. Learn more about our wide range of product offerings to find out how we can help you achieve greater bottom line results. Steel, processing, service, and commitment. Metals USA—Your partner for all your steel needs.

MetFin

booth 137

Suffield, Conn.

ph: 860.668.1050 | **toll free:** 800.537.8966

www.metfin.com

MetFin Shotblast Systems 40 year old American manufacturer of industry leading, heavy-duty, automated shotblast equipment. Built on a lead team having hundreds of years of combined experience, we meet the unique production requirements of each customer by providing flexible and innovative solutions. MetFin tailors systems to integrate seamlessly into new or existing operations and provide years of dependable service in this demanding industrial environment. We take pride in building durable, easy-to-maintain blast equipment with a focus on our customers' long term satisfaction.

Meyer Borgman Johnson

booth 1345

Minneapolis, Minn.

ph: 612.338.0713

www.mbjeng.com

Meyer Borgman Johnson (MBJ) provides PE licensed steel connection design, connected model delivery, erection engineering, stair and rail engineering, and related services to the structural steel community. We have one of the largest connection teams servicing the U.S. and Canadian markets. Providing consistent quality services, economic solutions and timely results are our top priorities. These services are a subset of our broad structural engineering services for the built environment. We have 80+ structural engineers and are licensed throughout the U.S. and Canada.

Mid Atlantic Global

booth 200

www.midatlanticmachinery.com

Miller Electric Mfg., LLC

booth 2218

www.millerwelds.com

Miner Grating Systems, a Powerbrace Company

booth 2002

Dallas

ph: 214.630.0033

www.minergrating.com

Miner Grating Systems is North America's leading manufacturer and fabricator of grating

products. Our lines consist of bar grating (Premier Grate), diamond safety grating (Premier Diamond), and round hole safety grating (Premier Grip). Our mission is to provide the highest quality grating products and be the most cost effective solution provider. We welcome the opportunity to partner on any projects requiring grating for steps, platforms, or walkways for use on OEM equipment or in plant maintenance.

MiTek

booth 1512

Mission Viejo, Calif.

ph: 949.238.8900

www.mii.com

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

Modern Steel Construction magazine

booth 2235

Chicago

ph: 312.896.9022

www.modernsteel.com

Modern Steel Construction magazine is the official publication of the American Institute of Steel Construction. By focusing on innovative and cost-effective steel designs and applications, *Modern Steel Construction* brings its readers in-depth information on the newest and most advanced uses of structural steel in buildings and bridges. *Modern Steel Construction* is the leading magazine for professionals involved in the design and construction of steel-framed buildings and bridges. Advertising in *Modern Steel Construction* is the best way for you to reach your customers directly.

Modern Steel Construction

MOLD-TEK Technologies, Inc.

booth 1342

Cumming, Ga.

ph: 330.294.4746

www.moldtekengineering.com

Mold-Tek Technologies, Inc. belongs to a 100 million group. MTTL is one of the largest leading engineering and technology solutions partners to many key players in the market. We specialize in providing structural steel detailing and engineering services, connection design certification and sealing with BIM coordination for all steel fabricators in the U.S. and Canada. We follow ISO 9001:2015 certification quality processes. Since our inception we have always believed in long-term partnerships with our clients and invest substantial resources internally in software development, quality control, and training.

NASCC/WSBS Exhibit Sales

booth 2245

United States

ph: 231.995.0637

aisc.org/nascc/exhibit

NASCC: The Steel Conference is an affordable and easy way to reach your target customer. As an exhibitor, you can count on The Steel Conference to deliver up to 5,000 industry professionals; more than any other industry event of its kind. The Steel Conference exhibit hall is your chance to personally interact with key decision-makers in the structural steel industry. When it comes to steel design and construction, these key industry players come to find out what's new, who's got it, and how it can work for them. Don't be left out. Join other top suppliers and manufacturers today!

National Institute of Steel Detailing, Inc.

booth 2231

www.nisd.org

National Steel Bridge Alliance

booth 2242

Chicago

ph: 312.670.2400

aisc.org/nsba



The National Steel Bridge Alliance (NSBA), a division of AISC, is a national, non-profit organization dedicated to the advancement of steel bridge design and construction. NSBA functions as the voice of the bridge fabricators and steel mills while also partnering with the bridge design and construction community. NSBA's partners include AASHTO, FHWA, state DOTs, design consultant, contractors, and academia. With these resources, NSBA is uniquely positioned to find solutions to the toughest bridge challenges, including those related to cost, sustainability, and performance.

New Millennium Building Systems

booth 1610

Fort Wayne, Ind.

ph: 260.969.3582

www.newmill.com

Control project costs, enhance project performance and ensure project success with New Millennium. From steel joists and joist girders to steel roof and floor deck, we engineer and manufacture cost-efficient, high-performance building solutions for a range of commercial applications. Our specialists assist you in specifying and engineering the steel joists and steel deck best suited for your project, whether it's in the education, multi-family, multi-story office, warehouse or large-venue market. With manufacturing facilities across North America, we're built for collaborative, expedited project delivery.



NEW MILLENNIUM

A Steel Dynamics Company

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Nexus Steel Detailing, Inc.

booth 2233
 Naperville, Ill.
ph: 779.703.5626
www.nexus-es.com

Nexus, with a highly experienced staff, provides connection design and steel detailing services for industrial and commercial steel structures. Detailing services include 3D modeling using Trimble Tekla software and generate erection drawings, detail drawings, gather sheets, customized reports as per customer requirements, NC, DXF, KSS, EJE, SDNF, and IFC files. Connection design services include design of connections as per AISC standard either by ASD or LRFD specifications. Capable of designing all connection types from simple to complex details. We maintain PE licensure in several states in the U.S.

Nitto Kohki U.S.A., Inc.

booth 600
www.nittokohki.com

Nucor – Beam Mill Group

booths 1406,1306,1206
www.nucoryamato.com
www.nucor.com/products/Steel-Beam

Nucor has two beam mills: Nucor-Yamato Steel in Blytheville, Ark. and Nucor Steel Berkeley in Huger, S.C. Our Nucor-Yamato facility is the only North American producer of high-strength, low-alloy beams. Manufacturer of wide flange structural steel shapes (up through W14730 columns, and W44 beams), H-piles (including HP16 and HP18), sheet piling, angles, channels, and car building shapes. Grades include ASTM A36, ASTM A572, ASTM A588, ASTM A690, ASTM A709, ASTM A992, ASTM 913; and CSA G40.21-13 Grades 345WM and 345WMT.

NUCOR®
BEAM MILL GROUP

Nucor – Corporation

booths 1406,1306,1206
 Charlotte, N.C.
www.nucor.com

Nucor and its affiliates are manufacturers of steel and steel products including: carbon and alloy steel—in bars, beams, sheet and plate; hollow structural section tubing; electrical conduit; steel piling; steel joists and joist girders; steel deck; fabricated concrete reinforcing steel; cold finished steel; precision castings; steel fasteners; metal building systems; steel grating; and wire and wire mesh. Nucor proudly uses recycled scrap to make high-quality steel with low emissions. Using one of the cleanest and most energy efficient steel-making processes available.

NUCOR®

Nucor – Fastener Division

booths 1406,1306,1206
www.nucor-fastener.com

Nucor Fastener manufactures high-quality hex head cap screws, finished hex nuts, structural bolts, nuts, assemblies, flange bolts and built-to-print fasteners, head styles, dimensions, and grades can be customized to meet individual specifications.

NUCOR®
FASTENER

Nucor – Plate Mill Group

booths 1406,1306,1206
www.nucorhertford.com
www.nucortusk.com

Nucor Steel Plate Mill Group manufacturers a wide range of carbon, alloy, high-strength low alloy (HSLA), pressure vessel and heat treated (normalized and quench and tempered) products available as discrete, cut-to-length, or coiled plate. Our mills offer a wide range of gauges, widths, lengths, and grades that are customized to meet each individual customer's precise specifications.

NUCOR®
PLATE MILL GROUP

Nucor Skyline

booths 1406,1306,1206
www.nucorskylines.com

Nucor Skyline is the one source for all your piling needs, supplying and manufacturing an unparalleled assortment of bearing piles, sheet piles, spiralweld, rolled and welded, and ERW pipe, anchors, micropiles, threaded bars, tie rods, wide flange, other structural sections, and accessories. Skyline Steel, LLC (doing business as Nucor Skyline) is a wholly-owned subsidiary of Nucor Corporation, North America's most diversified steel and steel products company. Nucor Skyline serves the U.S., Canada, Mexico, the Caribbean, Central America, and Colombia markets.

NUCOR®
SKYLINE

Nucor Tubular Products

booths 1406,1306,1206
ph: 708.496.0380 | **toll free:** 800.376.6000
www.nucortubular.com

Nucor Tubular Products is committed to unmatched quality and service. With eight locations located across the United States and a vast array of sizes and products produced, we can meet any specifications your project requires. NTP manufactures high quality HSS, piling, A53 pipe, fire protection sprinkler pipe, auto mechanical tubing, and electrical steel conduit meeting ASTM A500, A1085, A53, A513, A252, and A153/A175 specifications, among others. Our products are made from Nucor sheet steel from an electric arc furnace (EAF), making them the greenest tubular products available.

NUCOR®
TUBULAR PRODUCTS

Nucor Vulcraft/Verco Group

booths 1406,1306,1206
 North America
www.vulcraft.com
www.vercodeck.com

Nucor, Vulcraft/Verco engineers and manufactures steel joists and deck (for structural roof or floor systems), as well as steel bar grating. We also provide, RediCor, a modular steel form system for concrete stair and elevator cores. Nucor, Vulcraft/Verco also provides multiple design aids and resources, such as our online design tools, to support the design community.

NUCOR®
VULCRAFT

Ocean Machinery, Inc.

booth 502
 Fort Lauderdale, Fla.
Ph: 954.956.3131 | **toll free:** 800.286.3624
www.oceanmachinery.com

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

Ohio Gratings, Inc.

booth 1738
 Canton, Ohio
ph: 330.477.6707 | **toll free:** 800.321.9800
www.ohiogratings.com

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

OpenBriM Platform

booth 1710
 New York
ph: 212.991.8956
openbrim.org

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

OTH – Remote Controlled Hooks

booth 2227
 Montréal, Quebec
 Canada
ph: 514.274.7554
othrigging.com

Our remote controlled hooks are designed to enable working teams to release the rigging from a safe distance and perform more lifts in a workday.

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Ovation Services, LLC

booth 1644

Copley, Ohio

ph: 330.400.2833

www.4ovation.com

Ovation Services is a leading provider of engineering services. Combining experience, technology and a client-centric approach, Ovation Services provides structural steel detailing, connection design, and BIM services across the United States. The acquisition of MMW, Inc., a detailing firm with over 30 years experience in the steel industry, gives Ovation Services a talented project management team to ensure a quality product. Strong leadership, global resources, and U.S. based checking uniquely qualify Ovation to be your preferred partner.

P2 Programs

booth 1627

Dripping Springs, Texas

ph: 512.858.2007 | **toll free:** 800.563.6737

www.p2programs.com

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

Pacific Stair Corporation

booth 1803

Salem, Ore.

ph: 503.390.8305 | **toll free:** 800.477.8247

www.pacificstair.com

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

Pan Gulf Technologies

booth 800

Thane West, Maharashtra

India

ph: 91.9870.222.581

www.pangulftech.com

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

Pannier Corporation

booth 2206

www. pannier.com

Paramount Roll and Forming, Inc.

booth 2027

Adelanto, Calif.

ph: 562.944.6151 | **toll free:** 888.400.3883

www.paramount-roll.com

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

PartILLATION: Visions in Steel

booth 2602

Houston

ph: 281.387.2480

www.aisc.org

PartILLATION: Visions in Steel is a traveling exhibit featuring a curated collection of photography and the work of visual artists illuminating steel in the built environment. In its form, PartILLATION is a created word, borrowing from the idea of provoking an exhibit that is part art and part installation to elicit and celebrate the familiar references and contributions of steel architecture in the built environment. Through the careful capture of sound, visuals, portraiture, and interviews, the exhibition explores five themes: evolution, humanism, innovation, history, and the legacy of steel architecture.

Pat Mooney, Inc.

booth 102

www.patmooneysaws.com

Peddinghaus Corporation

booth 902

Bradley, Ill.

ph: 815.937.3800

www.peddinghaus.com

Peddinghaus Corporation produces the toughest steel fabrication technology in the world. Every hand-assembled machine is the gold standard for what structural steel fabrication equipment should be. We understand that our machines are more than just a tool for our customers, it's the lifeblood of their company. We dedicate ourselves to working closely with fabricators throughout every step of their Peddinghaus experience—because when they succeed, we succeed together.

Power of Design Group, LLC

booth 2223

www.podgrp.com

PPG Protective & Marine Coatings

booth 1620

Pittsburgh

toll free: 888.9PP.GPMC

www.ppgpmc.com

PPG delivers protective coating solutions for a wide range of industries. Whether our customers need proven protection from corrosion, high temperatures and fire or want to ensure durability and aesthetic performance that will protect

valuable assets, we have the advanced coating systems that can meet the specific needs of any environment.

Precision Steel Systems

booth 202

Lincoln, Neb.

www.precisionsteelsystems.com

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

Procure

booth 1141

Carpinteria, Calif.

ph: 866.477.6267

procure.com

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

Prodevco Robotic Solutions Inc.

booth 537

Concord, Ontario

Canada

ph: 905.761.6155

www.prodevcoind.com

Prodevco Robotic Solutions offers advanced robotic plasma steel cutting systems. There are three models—PCR42, PCR41, and PCR31—that will process standard structural steel profiles, round tubes from 4–26 in., cuts copes, notches, holes, and weld preps, splits beams, and scribes and marks on all four faces of H-beams, channels, angles, HSS, and plates using automated robotic technology. All-in-one system reduces fabrication time, manpower, and materials to meet everyone's goal: lower manufacturing costs.

Project + Quality Solutions

booth 1846

Portland, Ore.

ph: 503.550.9918

www.projectqualitysolutions.com

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

Proxedge

booth 2418
Fort Myers, Fla.
ph: 239.301.0301
proxedge.com

Proxedge LLC (ISO 9001:2015) is an accomplished structural engineering solutions provider in the fields of steel detailing, connection design, PEMB and BIM solutions. Our team of proficient checkers, project managers and detailers are specialized in delivering projects across industrial, commercial, residential, and other industries. Project schedules and quality of drawings are synchronized with the expectations and standards of our clients. We have 95% accuracy in meeting the client project schedules.

Qnect LLC

booth 1318
Hadley, Mass.
ph: 413.387.4375
www.qnect.com

Qnect provides software and managed services that reduce the chaos of CA and mitigate schedule drift. In partnership with the project's SEOR, we deliver a 100% connection engineered and pre-detailed model during the design phase. Our team of CEs and pre-detailers, powered by our lightning-fast optimization software, can work with any structural engineer on any project to make it smoother and far more schedule-certain.

Qualis Solutions, LLC

booth 1904
www.qualissolutions.com

Quality Emphasis Steel Solutions Pvt., Ltd.

booth 2200
www.qessindia.com

Qubatic Steel Detailing LLC

booth 501
Charlotte, N.C.
ph: 91.9823.045.476
www.qubatic.com

We are the fastest-growing engineering services company serving the steel industry for the last 10 years. We proudly provide structural steel detailing, connection design, BIM, and estimation services. Our mission is to help our customers save time and maintain maximum profits on every job. Our dedicated team of more than 70 well-trained engineers and detailers are skilled in SDS2, Tekla Structures. Quality is absolutely essential to us, and we are proud to be affiliated with the AISC and NISD and possess an ISO 9001:2015 certification.

QuickFrames USA

booth 2023
www.quickframes.com

R.J. Watson, Inc.

booth 1810
www.RJWatson.com

Radley, LLC

booth 1240
Grand Rapids, Mich.
ph: 616.541.6010
www.radley.com/steel

Increase visibility to materials with jobsite tracking and traceability while maximizing your workforce with labor tracking. Streamline and automate work flows with bar code or RFID scans while reducing errors with real-time data validations. Track work-in-progress (WIP) and validate loads against Tekla PowerFab (FabSuite), or other business systems.

Ray Fu Enterprise Co., Ltd.

booth 1907
Kaohsiung
Taiwan
ph: 886.7.556.0180
www.ray-fu.com

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

REX Engineering Group

booth 2008
Naperville, Ill.
ph: 630.318.1725
www.rexeg.com

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

RISA

booth 1226
Foothill Ranch, Calif.
ph: 949.951.5815 | **toll free:** 800.332.7472
www.risa.com

RISA has been developing leading-edge structural design and optimization software for over 30 years. Our products are used by 24 of the top 25 U.S. design firms in over 70 countries around the world for towers, skyscrapers, airports, stadiums, petrochemical facilities, bridges, roller coasters and everything in between. The seamless integration of RISAFloor, RISA-3D, RISAFoundation and RISAConnection creates a powerful, versatile and intuitive structural design environment, ready to tackle almost any design challenge.

SDS2 by ALLPLAN

booth 1218
Lincoln, Neb.
ph: 402.441.4000 | **toll free:** 800.443.0782
www.sds2.com

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



SDS2
BY ALLPLAN

SE University (SEU) by SE Solutions

booth 2301
Holland, Mich.
ph: 616.836.1702
www.LearnWithSEU.com

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

Seismic Bracing Company

booth 2035
Salt Lake City
ph: 801.550.7745
www.thesbcllc.com

We are makers of Buckling Restrained Brace (BRBs). The state of the art braces for bracing buildings and other structures during earthquakes. As the name implies, BRBs do not buckle. They smash and stretch axially absorbing seismic energy. We have patented a simple, easy and repeatable methods to manufacture BRBs, which brings better value to projects. Our methods have been fully tested and exceed governing building code requirements. All our projects to date have been a great success for our clients and us, delivering on time and without erection issues.

Shandong Hanpu Machinery Industrial Co., Ltd.

booth 1736
Jinan City, Shangdong
China
ph: 86.531.8353.0737
www.hanputool.com

China's most professional electric torque wrench and shear wrench manufacturer. Accept customized production. Newly products keep on the way.

Sherwin-Williams Protective and Marine

booth 1714
Cleveland
ph: 216.566.2000 | **toll free:** 800.524.5979
www.protective.sherwin.com

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

Shop Data Systems, Inc.

booth 1802
Richardson, Texas
ph: 972.494.2719
www.shopdata.com

Shop Data Systems (SDS) has been servicing the steel fabrication industry for more than 30 years with CAD/CAM software solutions. The system will import flat plate components directly from your structural design software. System features: imports file-embedded quantity and material, import multiple files in seconds, import DSTV or DXF files, machine tool paths are applied automatically, tools with or without piece mark, automatic shape nesting, chain cutting, common line cutting, automatic plate trim, personalized training and support, and remnant inventory tracking.

Short Span Steel Bridge Alliance

booth 1945
Washington
ph: 202.452.7100
www.shortspansteelbridges.org

The Short Span Steel Bridge Alliance (SSSBA) is a group of bridge and buried soil steel structure industry leaders who have joined together to provide educational information on the design and construction of short span steel bridges in installations up to 140 feet in length.

Simpson Strong-Tie Co.

booth 1532
Pleasanton, Calif.
ph: 925.560.9000 | **toll free:** 800.999.5099
www.strongtie.com

For 65 years, Simpson Strong-Tie has focused on creating structural products and software solutions that help people build safer and stronger structures. Simpson Strong-Tie was one of the first companies to develop connectors specifically for steel framing. Today, we continue to invest in product research and development to offer our customers connectors, fasteners, anchors, steel shearwalls, and special moment frames, which feature our innovative Yield-Link® connection. Our commitment to the steel industry has never been stronger.

Simsona Corporation

booth 2011
Rockville, Md.
ph: 301.774.0880
www.simsona.com

Simsona Corp. provides highest quality steel detailing (structural steel, misc. steel, rebar) and connection design services. All of our shop

drawings are produced under supervision of highly trained engineers. We use Tekla Structures for steel detailing and produce CNC, DXF, DSTV, and KSS files. Our project list includes commercial projects, schools, stadiums, hospitals, high-rise structures, multi-story office buildings, hotels, airports, churches, industrial structures, and refineries. We specialize in BIM services to the construction industry. We provide calculations and stamped shop drawings in all 50 states.

Skidmore-Wilhelm

booth 1630
www.skidmore-wilhelm.com

SKM Industries, Inc.

booth 2407
Olyphant, Pa.
ph: 570.383.3062 | **toll free:** 800.851.8464
www.skmproducts.com

Established in 1980, SKM Industries, Inc. is a manufacturer of Super Met-Al Markers and Metal Pro Galvanized Steel markers, specially formulated to come completely off in the tank during the galvanizing process. We make specialty markers for all of your marking needs.

SLIPNOT

booth 2401
Detroit
ph: 313.923.0400 | **toll free:** 800.754.7668
www.slipnot.com

SLIPNOT® is a leading provider of specialized safety flooring products and surface technologies, covering the walkways, entryways, stairs, ladders and more, where you live, work and play. With products and technologies Manufactured in the U.S., we transform potentially hazardous spaces like food and beverage manufacturing and highly trafficked office buildings and retail spaces into safe and efficient environments. Much to the delight of safety managers and building owners everywhere, once SLIPNOT® is installed, over 90% of slips and falls can be avoided.

Soitaab USA, Inc.

booth 700
Naperville, Ill.
ph: 312.856.6970
www.soitaabusa.com

Since 1938, Soitaab has been a world leader in the manufacture of CNC plasma, flame, laser and water jet cutting machines. Soitaab's equipment offerings range from simple plug-and-play machines to highly engineered all-in-one heavy fabrication lines. Our machines can be equipped with several accessories such as drilling and tapping units, surface and hole milling, bevel heads for welding prep, countersinking, marking, pipe and dome cutting, sophisticated handling systems, and many others.

South Atlantic Galvanizing

booth 2015
Wilmington, N.C.
www.southatlanticllc.com

We provide hot dip galvanizing per ASTM A123 to fabricators and OEMs all over the country. We have nine strategically located galvanizing plants throughout the Southeastern U.S. Please make an appointment, or look at our brochure to learn more.

SprayTec Coating Solutions, LLC

booth 2429
Suwanee, Ga.
ph: 404.386.3652
www.sprayteccoat.com

SprayTec Coating Solutions provides "One Source" for your industrial service solutions. SprayTec offers a broad range of field and shop applied surface technology solutions including: thermal spray/metallizing, specialty coatings and linings, epoxy and plural coating systems, safety traction/anti-skid, atmospheric and chemical corrosion, abrasive blasting surface preparation, and lead and asbestos abatement. Union and open shop non-union operations through teaming efforts.

Square Set Metals Recruiting, LLC

booth 1940
Novelty, Ohio
ph: 973.809.4530
www.squaresetmetals.com

Square Set Metals Recruiting, LLC is a firm specializing in steel and metals that goes above and beyond to understand the needs of the hiring manager, team, and organization in order to make the process highly personalized and effective. When you partner with Square Set Metals, you never have to spend your valuable time educating a recruiter or a new hire about your product or industry. Square Set Metals will identify, evaluate, and present highly-qualified, top-performing candidates who will not only be a cultural fit to your team but additive to your company's bottom line.

SRG Onesource, LLC

booth 1922
Mission, Kan.
ph: 816.297.3132
www.srgonesource.com

SRG Onesource is a professional steel detailing firm located in Mission, Kan. We have been in business since 1996 providing our clients with a quality service.

St. Louis Screw & Bolt

booth 1426
Madison, Ill.
ph: 314.389.7500 | **toll free:** 800.237.7059
slbolt.com

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

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Companies written in orange are part of the Bridge Pavilion.

Stainless Structural America

booth 1638

United States

www.stainless-structurals.com

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

Steel and Pipe Supply

booth 1544

Manhattan, Kan.

www.SteelAndPipe.com

Steel and Pipe Supply Company, Inc. distributes high-quality carbon steel to customers across the Midwest. We keep a large inventory in multiple warehouses, provide value-added processing services, and maintain a strong distribution network—all to help our customers get the steel they need quickly, efficiently, and at a competitive price. We have warehouses and processing facilities optimally located in and around: Houston; Longview, Texas; Tulsa, Okla.; St. Louis; Kansas City, Kan.

Steel Deck Institute

booth 2046

Glenshaw Pa.

ph: 412.487.3325

www.sdi.org

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

Steel Dynamics Long Products Group

booth 1602

Columbia City, Ind.

ph: 260.625.8100 | **toll free:** 866.740.8700

www.stld-cci.com

Steel Dynamics, Inc. is one of the largest domestic steel producers and metals recyclers in the United States based on estimated annual steelmaking and metals recycling capability, with facilities located throughout the United States and in Mexico. Steel Dynamics produces steel products, including hot roll, cold roll, and coated sheet steel, structural steel beams and shapes, rail, engineered special-bar-quality steel, cold finished steel, merchant bar products, specialty steel sections, and steel joists and deck.

Steel Erectors Association of America

booth 2136

Winston-Salem, N.C.

ph: 336.294.8880

www.seaa.net

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

Steel Founders' Society of America

booth 2400

Crystal Lake, Ill.

ph: 815.455.8240

www.sfsa.org

SFSA, akin to AISC, is a technical association. Members of SFSA are steel foundries that supply a range of cast steel products for demanding environments such as railroad, mining, construction, military, and nuclear. SFSA can assist you in utilizing steel castings for building construction. Steel castings offer performance, aesthetics, design freedom, and green manufacturing. SFSA leads the Steel Performance Initiative (SPI) program, a collaborative structure of steelmakers (mills, forge, cast), researchers, and end-users to advance steel technology development for commercial and defense applications.

Steel Joist Institute

booth 2044

Florence, S.C.

ph: 843.407.4091

www.steeljoist.org

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

Steel Plate

booth 1044

Pendergrass, Ga.

ph: 888.894.8818

www.steelplate.us

Steel Plate Ohio is located in Streetsboro, Ohio, right outside of Cleveland, Ohio. This location offers four oxy-fuel machines, one plasma machine, and six overhead cranes with up to

35-ton capacity and the capability to burn plates up to 20 in. thick. Steel Plate Georgia currently offers seven oxy-fuel machines, one plasma machine, two Quickmill Intimidators, five overhead cranes with up to 40 ton capacity, and railcar access. Our oxy-fuel machines offer table space ranging from 10–20 ft wide and up to 60 ft long, while our plasma machine offers a 24 ft by 83 ft table, making no job too big to handle!

Steel Plus Network

booth 1800

Canada

ph: 902.843.0054

www.steelplus.com

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

Steel Projects Corp.

booth 618

United States

www.steelprojects.com

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

Steel Tek Unlimited

booth 1641

www.steelteku.com

Steel Tube Institute

booth 1903

Glenview, Ill.

ph: 847.461.1701

www.steeltubeinstitute.org

The Steel Tube Institute is the leading technical resource in North America for all steel tube/HSS products. STI's programs include continuing education, technical resources, technical assistance, and safety programs as we promote best practices in engineering design, environmental concerns, manufacturing techniques, industry safety, and the overall steel industry. Our main goal is to increase utilization of HSS and other tubular products in construction and other industries, and to reveal the wealth of possibilities afforded by designing with HSS.

Steelmax Tools, LLC

booth 400

Littleton, Colo.

ph: 303.690.9146 | **toll free:** 877.833.5629

www.steelmax.com

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

Steelweb, Inc.

booth 2405

Coral Springs, Fla.

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

steelweb.com

Steelweb Inc. has offered comprehensive steel detailing services for over 25 years. Based in Florida, the company specializes in 3D detailing of medium to large industrial and commercial projects such as schools, hospitals, offices, with the occasional small scale jobs or difficult revamps. Our mission is to deliver the highest quality, error-free shop and erection drawings in a timely and efficient manner. Our team of 60 detailers provide the best services including project management, BIM coordination, connection design and estimating. We work with both Tekla and SDS2 software.

Structural Bolt and Manufacturing, Inc.

booth 2204

Nashville, Tenn.

ph: 615.255.2540 | **toll free:** 800.423.1730

www.structuralbolt.com

Since 1985, Structural Bolt and Manufacturing has been providing the finest products and services in the structural fastener industry. We specialize in heavy construction fasteners and anchoring products for the structural steel industry. As one of today's leading anchor rod manufacturers and structural fastener distributors in the U.S., our capabilities are limited only by an engineer's imagination.

Structural Engineering Institute of ASCE

booth 1942

Reston, Va.

ph: 703.295.6195

www.asce.org/SEI

Join more than 30,000 members of the Structural Engineering Institute of ASCE to connect, learn, advance your career, and build the future of the structural engineering profession. SEI stimulates technological advancement, improves professional practice, and drives the practical application of cutting-edge research. Join us: Structures Congress May 3-6 in New Orleans; SEI Standards Series; Collaborative Reporting for Safer Structures US; SEI2050 Committing to Net Zero; ASCE 7 and more; SEI Futures Fund: www.asce.org/SEI; join or renew your ASCE/SEI Membership Today: www.asce.org/SEIMembership

Structural Stability Research Council

booth 2239

Chicago

ph: 312.670.7015

www.ssrcweb.org

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

STRUMIS, LLC

booth 1244

Collegeville, Pa.

ph: 610.280.9840

www.strumis.com

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

Struzon Technologies Inc.

booth 2039

struzon.com

Struzon, a trusted structural steel detailing/engineering service partner to the construction industry and we are an organization that wears numerous caps. From being market pioneers of structural detailing, engineering, design, and research, to do well architectural results in both residential and industrial divisions, we are enlisting our company in different arenas.

Sumter Coatings, Inc., an Ergon Company

booth 2209

Sumter, S.C.

ph: 803.481.3400 | **toll free:** 888.471.3400

www.sumtercoatings.com

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

Superior Glove

booth 2105

superiorglove.com

Swisher Tools, LLC

booth 1446

Battle Ground, Ind.

ph: 480.250.5266

www.swishertools.com

We are a family owned company that specializes in innovative rigging tools for the steel industry.

Our products are safer, and efficient making your project more profitable.

SY Stairs

booth 1326

www.systairs.com

TDS Industrial Services, Ltd.

booth 1804

Surrey, British Columbia

Canada

ph: 604.599.1570 ×10

www.tdsindustrial.com

TDS—where better is our standard. TDS has been in the steel detailing business for over 40 years and continues to service our steel fabrication customers by providing exceptional value with certainty and confidence. Being an ISO 9001:2015 certified company we understand the need to manage and mitigate risks associated with offshore detailing and have developed a system and procedures to have 100% control over all aspects of projects. From the smallest misc projects to the heavy industrial, we have the team to do it all.

Team Detailing Solutions Pvt., Ltd.

booth 300

Chennai

India

ph: 913.674.4485

teamdetailling.com

Team Detailing Solutions (TDS) specializes in structural steel detailing, connection design, and estimating over 17 years in business. We operate SDS2 and Tekla Structure, Autodesk, Descon, and Mathcad (90+ licenses) to produce 3D models and detailed fabrication and erection drawings for industrial, commercial, and infrastructure projects to AISC/CISC standards with a team of 150+ detailers, checkers, and project managers. They are capable of completing projects small/large and complex structures. We provide connection/delegated misc. design calculations with Certified American PE stamp.

Techflow, Inc.

booth 1611

www.techflowengg.com

Tectonix Steel, Inc.

booth 2036

www.tectonixsteel.com

Telge Projects Pvt., Ltd.

booth 2215

Pune, Maharashtra

India

ph: 469.297.2384

www.telgeprojects.com

Telge Projects is one of the premier engineering service providers across the globe. Our services include civil engineering services for the global AEC industry. Using the latest BIM software, we are specialized in structural modelling and detailing for precast concrete structures, steel framed systems (SFS), steel structures, cast in situ (CIS), composite buildings, and turnkey civil construction.

Terracon Consultants, Inc.

booth 1936

Olathe, Kan.

toll free: 800.593.7777

www.terracon.com

Wherever you are on your project journey, Terracon's employee-owners are ready to meet you where you are and help you reach your goal. Since our founding in 1965, Terracon has grown to become a thriving, employee-owned, multidiscipline engineering consulting firm. On-time and real-time data-driven insights, provided by our talented employee-owners, create an unmatched client experience that spans the lifecycle of any project from earth to sky.

Threadline Products, Inc.

booth 2100

Charlotte N.C.

ph: 704.527.9052

threadlineproducts.com

Fast. Flexible. At your service. Threadline Products, Inc. has supplied threaded products and miscellaneous steel to the construction industry since 1984. We can furnish any bolt or fastener for commercial building construction and concrete; F1554 anchor bolts, A325 structural connection bolts, grade $\frac{5}{8}$ bolt, socket headed bolts, rebar and more. Threadline has carbon, stainless and alloy material in stock ready to fabricate and meet your custom requirements with expert welders on our fabrication team. With 1–2 day shipping available to over half the U.S., our speed is unmatched. We are D.B.E/HUB certified.

Tnemec Company, Inc.

booth 2126

North Kansas City, Mo.

ph: 816.483.3400 | **toll free:** 816.483.3400

tnemec.com

Established in 1921, Tnemec Company, Inc. understands the importance of providing facilities with the most high-quality products available. Tnemec's combination of time-tested coatings technology has produced an advanced coatings system featuring Aerolon—a fluid-applied, thermal insulating coating that can be applied in areas where traditional installations are problematic. With over a 120 architectural and industrial coating products and invaluable technical support, Tnemec provides coating specification assistance to engineers, owners and contractors around the globe.

Tokbo S.R.L.

booth 2132

Veduggio con Colzano, Monza, Brianza
Italy

tokbo.it/en

Sensorizes bolted connections, provides remote predictive monitoring, enables a digital service. Tokbo System Network of sensors applied on bolted joints, connected to each other as well as to a gateway. Dedicated platform for visualizing the digital twin data. Digitization for safety and support of predictive maintenance operations. Tokbo has developed a proprietary solution to digitize bolted connections by remotely and continuously monitoring the status of the clamping force and the structural vibrations.

Transfluid Tube Processing Machinery, Inc.

booth 302

www.transfluid-us.com

The solution for tubes. Many promise solutions. We are the solution. We are transfluid®. The solution for tubes. For this, we are working continually on progress and developing for our customers technologies which are easy to use, sustainable and specifically tailored to the respective requirements. This is not only the standard we set ourselves, it is our motivation for the future. This is because our drive is to realise, together with our customers and for our customers, ideas which give rise to solutions.

Trilogy Machinery, Inc.

booth 512

Belcamp, Md.

ph: 410.272.3600 | **toll free:** 888.988.ROLL

www.TrilogyMachinery.com

Trilogy Machinery, Inc. is the exclusive North American distributor for Swebend bending rolls as well as exclusive U.S. distributor for Sunrise ironworkers including CNC models, Lemas plate bending rolls, BSP tube punching systems, Inductaflex machines and U.S. distributor for Synergy bending rolls. Trilogy offers sales, service and support for every brand they sell from their Maryland headquarters as well as local dealers around the country.

Trimble

booth 1416

Kennesaw, Ga.

ph: 770.426.5105 | **toll free:** 877.TEKLA.OK

www.tekla.com/us

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At Worker Efficiency, we've created a 14-course online video training series that teaches all the skills you need to have to work as an ironworker. From the fabrication process to erection, how to read drawings, OSHA qualification courses, and more, we are about training the next generation of steel construction workers by means of an internet connection. Our courses are the result of two years of case studies, research, and development to make sure that the information that is taught is streamlined and accurate to modern standards.

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Companies written in orange are part of the Bridge Pavilion.

This exhibitor list is current as of February 17. For the most up-to-date list, please download the conference



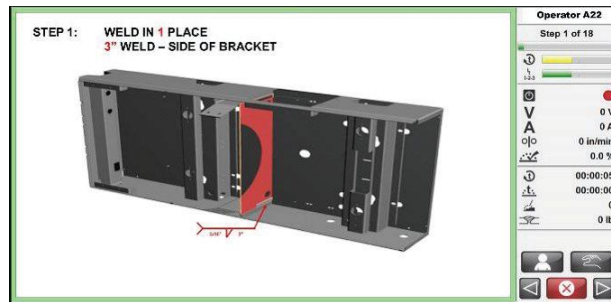
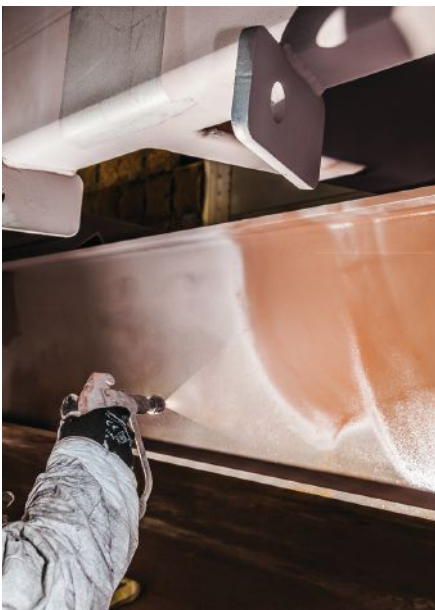
mobile app. Search the App Store or Google Play for "NASCC," visit aisc.org/nascapp, or scan the QR code.

new products

This month's New Products include advanced welding technologies, a new welding power source, and a new zinc-rich primer. All three companies are exhibitors at this year's NASCC: The Steel Conference, taking place April 12–14 in Charlotte, N.C. For more information about the conference and to register, visit aisc.org/nascc. And turn to page 57 for a full list of this year's exhibitors.

Tnemec Series 90-75 Tneme-Zinc

Tnemec Company, Inc., has launched a new innovative, water-based zinc-rich epoxy primer, Series 90-75 Tneme-Zinc, that offers extended protection to steel surfaces in architectural, industrial, and marine environments. Its isocyanate-free and ultra-low VOC formulation cures quickly and forms an open network polymer structure in the dry film, improving conductivity between zinc particles that provides superior galvanic corrosion protection. Tneme-Zinc meets AISC Class B surface requirements and is offered in a reddish-gray color. In addition, Series 90-75 is built to protect sustainable structures, meeting the VOC and CDPH emissions requirements of LEED v4.1 Low-Emitting Materials credit, as well as other environmental programs. This formulation is U.S. patent pending. For more information, visit www.tnemec.com or **Booth 2126**.



Lincoln Electric Power Wave Manager and Weld Sequencer

Advanced welding power sources and software open the door to take control of every machine and every weld. With the use of control tools such as Power Wave Manager, you can easily standardize your fleet's welding procedures, configure welding machine memories, and establish parameter range limits and lockouts. Furthermore, advanced tools such as Weld Sequencer software deliver an intelligent, visually aided process control solution that optimizes welding performance and quality. By providing easy-to-follow visual work instructions, the technology guides the fabricator step-by-step through the assembly process, along with continuous process monitoring that identifies weld count, cycle time, and depositions for each specific job. For more about these and other advanced welding technologies, visit www.lincolnelectric.com. You can also check out **Booth 1014** and/or the "Advanced Welding Technology and Industry 4.0" session.

Advanced welding power sources and software open the

Miller Electric XMT 650 ArcReach

Miller Electric Mfg., LLC, has announced the release of new welding power sources and a wire feeder designed to maximize productivity and cost savings and deliver the power needed for structural fabrication, steel erection, and shipbuilding. The XMT 650 ArcReach System lets users weld and gouge with a single system and make process changes at the feeder without a control cable. The system includes an XMT 650 ArcReach power source and an ArcReach 16 wire feeder. Configurations are available for field and shop applications, with remote polarity-reversing (PR) power source and non-polarity-reversing power source models—both compatible with the ArcReach 16 wire feeder. The remote polarity-reversing model lets operators switch polarity at the feeder, so they can quickly change between welding and gouging without having to walk back to the power source. For more information, visit www.millerwelds.com or **Booth 2218**.



IN MEMORIAM

Staley Rolfe, Fracture and Fatigue Expert, Dies at 88

Stanley T. Rolfe, PE, PhD, one of the nation's leading experts on fracture and fatigue, died January 23, 2023, at age 88.

A graduate of the University of Illinois, Rolfe began his career at U.S. Steel but is best known for the more than four decades he spent as a professor at the University of Kansas. A longtime member of ASTM International and recipient of the 2003 Charles B. Dudley Medal, he served for over 50 years on Committee E08 on Fatigue and Fracture and also contributed to the AASHTO Technical Committee on Steel Design (T-14).

"Stan has touched so many people's lives for the better—he was always focused on lifting others around him up and building their success—a true leader in every sense of the word," said Caroline Bennett, PE, PhD, the Dean R. and Florence W. Frisbie Associate Chair of Graduate Studies at the University of Kansas.

Rolfe is an inductee in the National Academy of Engineering. He also chaired the Technical Committee on Fracture and Structural Fatigue at the American Society of Civil Engineers, which, over the course of his life, made him a Fellow and an honorary member and presented him with the Ernst E. Howard Award.

His legacy includes more than 70 technical papers on fracture, fatigue, and behavior, as well as the popular textbook, *Fracture and Fatigue Control in Structures: Applications of Fracture Mechanics*, coauthored by John Barsom, which focused on the application of fracture mechanics to prevent fracture and fatigue failures in structures.

"It has been a privilege to call Stan a friend and a colleague for over 50 years," said John Barsom, PhD, a consultant and former chief of the materials behavior division at U.S. Steel Corp. "We coauthored several papers and a book on fracture and fatigue in structures and taught a short course for 24 years. He will be remembered as a dedicated teacher and a mentor, an excellent engineer, and above all, a good and honest man."

Added Duane K. Miller, PE, ScD, a welding design consultant with The Lincoln Electric Company: "I first 'met' Stan Rolfe when I purchased the textbook, *Fatigue and Fracture Control in Structures*, written with his coauthor Dr. John Barsom.

Their text was the basis for a graduate-level course on Fracture Mechanics that I was about to take. Little did I know that I'd eventually meet these two world-class experts who would become professional colleagues and personal friends. I was always honored when Stan would give me a call out of the blue just to see how things were going. This past January, I had my final conversation with Stan. I asked him if he'd be on the peer review panel for the AISC Design Guide on Avoiding Brittle Fracture I'm currently writing. In a very Stan-like way, he said, 'After breakfast, I take a walk. Then, I read the newspaper and *The Economist*. After that, I'm ready for some technical reading, so yes, I'd be honored to be on the peer review panel.' That will not happen now, but I'll always cherish his final comments to me that he'd be honored to be on the peer review panel when in reality, it was my honor to know such a technical genius."

Rolfe was also a member of the National Research Council Project Advisory Board and a past chair of the American Association of State Highway Transportation Officials' uncoated weathering steel study group.

"I was saddened to hear of Stan's passing, a mentor and friend of many years," said Edward P. Wasserman, PE, a senior technical advisor with Modjeski and Masters and former director of the structures division of the Tennessee DOT. "The bridge design community has relied on Stan's expertise in fracture mechanics and structural behavior of steel bridges to assess fatigue cracks, methods of arresting crack growth, and development of practical repair methods."

Rolfe was a well-known speaker, and many of his AISC lectures can be found at aisc.org/educationarchives.

"Stan's kindness and humility always impressed me," said Charles J. Carter, SE, PE, PhD, president of AISC. "I enjoyed his practicality and gift at teaching even the most complex subjects."



People & Companies

Magnumson Klemencic Associates (MKA) has named **David E. Eckmann, SE, PE, FAIA** its new president. In addition to his role as president, Eckmann also serves as the managing principal of MKA's Chicago office and as a member of MKA's Board of Directors.

Eckmann's qualifications as a licensed architect and structural engineer have positioned his career to bridge the gap between design and function, creating "first-ever" projects that combine architecture and structure.

Since joining MKA in 2005, Eckmann has served a leadership role in more than 100 of the firm's projects, including Chicago landmarks Aqua Tower, River Point Tower, the Wabash Building at Roosevelt University, The University of Chicago's Gerald Ratner Athletics Center, and O'Hare International Terminal 5.

"I am honored and excited to serve as MKA's next President," Eckmann said. "I look forward to expanded responsibilities in continuing MKA's commitment to providing consistent, reliable, and creative designs for our clients."

Eckmann is a longtime collaborator with AISC, having served as vice chair for the planning committee and chair of the architectural planning committee for NASCC: The Steel Conference. Additionally, he is the primary author of AISC's book *Designing with Structural Steel: A Guide for Architects* and has volunteered as a judge for AISC's IDEAS² Awards program.

Outside of AISC, Eckmann is a member of the University of Illinois School of Architecture's Tang Committee and a former member of the Department of Civil and Environmental Engineering's Structural Engineering Conference Committee. He is a current member of the Council on Tall Buildings and Urban Habitat (CTBUH) and previously served on SEAOL's board of directors.

IN MEMORIAM

Philip Torchio, Steel Welding and Erection Expert and AISC Code Contributor, Dies at 73

Philip Torchio, former president of Williams Enterprises of Georgia and a prominent contributor to AISC's *Code of Standard Practice for Steel Buildings and Bridges* (ANSI/AISC 303), passed on January 21 at his home in Jasper, Ga. He was 73.

Torchio was born on February 1, 1949, in New York State. As a young child, he moved to Aiken, S.C., with his mother and his stepfather, Harold Fletcher, who was the headmaster at Aiken Preparatory Boarding School. He graduated high school in 1967 from the Canterbury School in New Milford, Conn., and then went on to graduate from Georgia Tech with a bachelor's degree in industrial engineering in 1971. He started with Williams Enterprises in 1975 as an equipment manager and eventually became president before retiring in 2018, and he remained active on the company's Board until his passing. Drawing on his natural engineering talent, he crafted creative plans for scores of large steel projects throughout the Southeast. He also became a certified welding instructor (CWI) in early 1973 and a senior certified welding instructor (SCWI) in 2002.

Torchio served as a member of the AISC Code of Standard Practice Committee, one of just a handful of people who provided a steel erector's perspective to that group.

"Phil presented the erector's perspective at NASCC: The Steel Conference on multiple occasions," noted Tom Schlafly, AISC's director of engineering and research. "He added 'street cred' toward the message that innovation, quality, and knowledge of the requirements were keys to successful projects."

Torchio was also heavily involved in American Welding Society activities, serving as an AWS member from 1980 until his death. He was a member of the AWS Board

of Directors of PEMCO (Publications, Exhibitions, Marketing Committee) from 1989 to 1990, served as a District 5 Director from 1985 to 1989, and received the Distinguished Member Award for outstanding service and commitment to AWS in 1988 and the District Meritorious Award in 1991.

He also joined the AWS D1 Committee on Structural Welding in 2009, serving as Task Group Co-Chair of D1TG6 (Prequalification), Subcommittee Chair of D1Q (D1.1, Steel), and a member of the D1TG5 (Stud Welding) Task Group and the D1H (D1.3, Sheet Steel) Subcommittee, and also contributed several articles to AWS' *Welding Journal*.

Torchio was noted for his safety efforts, testifying on behalf of the Steel Erection Negotiated Rulemaking Advisory Committee (SENAC) in the 1990s to improve worker safety. He also aided in developing hexavalent chromium safety standards for small businesses in partnership with OSHA.

"An illuminating indication of his willingness to contribute to our industry was that after retiring as the president of William Erectors, Phil took the role of Chair of AWS D1Q," noted Schlafly. "Jennifer Molin [program manager of standards development with AWS] and I solicited and used his advice often because it was always valuable and fun. Phil was always happy to discuss proposals, directions, and inquiries and try new ideas and different possible paths. He often brought new and valid perspectives, and we ended every discussion feeling we had moved forward and spent our time well."

Outside of his professional career, Torchio was an avid woodworker and hunter and was involved for many years in Habitat for Humanity, both managing and building projects for those in need.

His philanthropy extended into the Atlanta Charity Clays, where his sport-shooting skills were unmatched as he raised money for multiple charities. Throughout his life, he spent many summers in Upstate New York at a "camp" his family has owned since 1916, where he fished, boated, and hunted.

"Phil was also a man with an unusual breadth of talents," continued Schlafly. "I once found him bending wood to make a Windsor chair. I also have a picture of him sailing a small boat on a lake in the Adirondacks. He was a hunter. He volunteered for Habitat for Humanity. And I never even looked at a wine list when we were out to dinner together because Phil would make the best selection. He had expertise in subjects of interest to both the welders and the company executives, and he was comfortable sharing it with all of us. And he made us comfortable sharing what we knew with him."

"I was lucky to work with Phil in the last few years of his career and keep in touch with him after he retired," expressed Tim Duke, corporate quality control and risk manager with Williams Enterprises. "To hear him tell of old projects and problems and genius solutions was an honor, and I hope to remember at least 10% of the pearls he shared with me. He was an absolute giant, and I will miss him dearly."

Torchio is survived by his wife of 46 years, Gail, daughter Angela, and son-in-law Nick.



SPECIFICATION

AISC Releases New Version of its Specification

The latest version of the AISC's flagship standard, the *Specification for Structural Steel Buildings* (ANSI/AISC 360-22), is now available at [aisc.org/2022spec](https://www.aisc.org/2022spec).

This document supersedes ANSI/AISC 360-16 and is the foundation for the forthcoming 16th edition of the *Steel Construction Manual*,

which AISC expects to publish later this year.

The new standard incorporates the results of a new collaboration between AISC's Committee on Specifications and Committee on the Code of Standard Practice. The two groups joined forces to standardize terminology and coordinate

requirements related to project delivery.

The 2016 edition and other related documents are available for reference at [aisc.org/standards](https://www.aisc.org/standards). And check out the March 2023 *SteelWise* article "A Century and Counting" (www.modernsteel.com) to learn about the updates in the 2022 version.



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- Peddinghaus Peddiwriter PW-1250**, (2) Hypertherm ArcWriter Plasma Torches, 4-Side Marking, Siemens CNC, 2013, #32397
- Peddinghaus Peddiwriter PW-1250**, (2) Hypertherm ArcWriter Torches, 4 Side Layout, Siemens CNC, 2020, #32400
- Ficpep Gemini HP 25B**, 8' x 20', 15 HP Drill with 8-ATC, HPR260XD Plasma, Ficpep Minosse CNC, Downdraft Table, 2014, #32158
- FICEP 1103 DDV** Drill, (3) 22 HP Drill Heads with 6-ATC, 22 HP, 65' Max Length, Ficpep Pegaso CNC, Conveyor, 2015, #32160
- Peddinghaus ABCM-1250** Beam Coping Machine, Siemens CNC, 50" Max Beam, 2017, #32313
- Peddinghaus ABCM-1250A** Beam Coping Line, 50" x 24" Max. Profile, Fagor 8055 Retrofit, #31655
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Mike Kelley

Artistic Endeavor

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THE ORANGE COUNTY MUSEUM OF ART (OCMA) is a central component of the Orange County, Calif., arts scene. With a focus on 20th- and 21st-century art by artists with ties to the state, the institution's focus has always been to educate and inspire the community.

And this past fall, the museum moved into its new home on the Segerstrom Center for the Arts campus in Costa Mesa. Designed by Morphosis Architects and John A. Martin and Associates, the new 52,000-sq.-ft building will allow OCMA to organize major special exhibitions alongside spacious installations from its collection. Structural steel was chosen for the framing system as it was able to achieve the museum's long-span spaces arranged in complex configurations, non-orthogonal architectural elements that cantilever more than 30 ft off the primary structure, and seismic design requirements inherent to Southern California construction.

This striking new building is one of this year's AISC IDEAS² Awards winners. To learn more about it and the rest of this year's winners, check out the upcoming May issue at www.modernsteel.com. ■



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