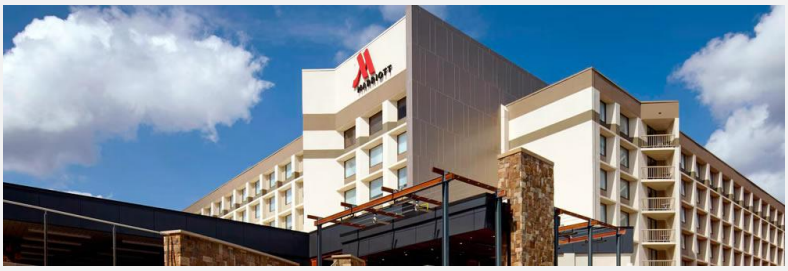
CFSEI

2025 ANNUAL EXPO

May 19-21, 2025



RALEIGH MARRIOTT CRABTREE VALLEY HOTEL
RALEIGH, NORTH CAROLINA

THANK YOU TO OUR SPONSORS

CFSEI
COLD-FORMED STEEL
ENGINEERS INSTITUTE

Welcome everyone to the 2025 CFSEI Expo, in Raleigh, North Carolina! It is that time of year again to join with our colleagues and industry sponsors to share experiences and knowledge.

As we do every year, we gather together to celebrate excellence in the cold-formed steel community, make new relationships and develop professional networks, and advance our knowledge in Cold Formed Engineering. We reaffirm our commitment to technical advancement, safety and reliability, and economy and efficiency – the hallmarks of great engineering.

Our technical sessions this year span topics from the ethics to composite beams and diaphragms, to offsite construction, and to sustainability. And, new this year, we have a section after the end of the technical sessions on Wednesday that will bring us additional talks on subjects from Emerging Technologies and current research topics. The one thing that I always take away from this conference is the collaborative feeling I get from this group of professionals. They are ever so willing to work together to promote a better understanding of this building material and its many uses. Instead of feeling of competition amongst our peers, it is a feeling of working together for a common goal to better our little niche of the industry. I look forward to seeing old friends and meeting new ones.

I would also like to take this opportunity to thank all the members of the CFSEI Executive Committee and Staff for their tremendous work this past year and especially here at the Expo. Without everyone's efforts we would not be able to accomplish anything close to what we have and put on such a tremendous event.

One great thing about our CFSEI Expo is that we shine a spotlight on excellence through our award winners (notably our John P. Matsen Award for Distinguished Service), our speakers, and our volunteers. What you see and experience during this conference is a result of decades of hard work and service for the cold-formed steel industry, and shining that spotlight sets the standard by which we define ourselves.

We also need to give special thanks to our returning and new sponsors who contribute so much to making the Expo successful:

Platinum
- ClarkDietrich Building Systems
- SFIA
- SSMA
- USG

Gold
- Advant Steel LLC
- Argos Systems
- FrameCAD
- Hilti
- TrusSteel
- Scottsdale Construction
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- MAX
- Marino/Ware
- MiTek
- New Millennium
- Steel Deck Institute
- Super Stud Building Products, Inc.
- The Steel Network

Bronze
- Aerosmith
- MRI Steel Framing LLC

And finally, one last big thank you to the presenters, staff, volunteers, and all of you attendees, for making this event and our industry a great one.

Sincerely,

Dana M. Hennis, PE, SE.
2024-2025 CFSEI Chair

TOP

MONDAY, MAY 19, 2025

2:00 p.m. – 4:00 p.m.
Raleigh Marriott Crabtree Valley Hotel – Rear Parking Lot

CFS – Tool Time Hands-On Demo

5:00 p.m. – 6:00 p.m.
Glenwood Terrace/Glenwood Foyer

Welcome Reception

6:00 p.m. – 7:00 p.m.
Glenwood Terrace/Glenwood Foyer

Young Engineer Group Mixer

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TUESDAY, MAY 20, 2025

7:00 a.m. – 4:00 p.m.	Registration at the Lobby
7:00 a.m. – 8:30 a.m.	Breakfast in Glenwood Ballroom
9:00 a.m. – 10:00 a.m. Glenwood Ballroom	**State of the Standards** Jay Larson, P.E.,F.ASCE, Steel Framing Industry Association, Patrick Ford, P.E., Steel Framing Industry Association Jon-Paul Cardin, P.E., Metal Building Manufacturers Association, Christopher Raebel, P.E., American Institute of Steel Construction, Thomas Sputo, P.E., Steel Deck Institute
10:00 a.m. – 10:15 a.m.	Break with Sponsors
Crabtree A-D 10:15 a.m. – 11:15 a.m.	**Cold-Formed Steel Classroom: Fluxural Member Design** Reinhold Schuster, Ph.D., P.Eng., S.E., University of Waterloo, Roger LaBoube, Ph.D., P.E., Cold-Formed Steel Engineers Institute
Crabtree E-H	**Special Loading Conditions for Cold-Formed Steel Trusses** Peter A. Humphrey, P.E., MiTek
11:30 a.m. – 12:45 p.m.	**Lunch: Annual Meeting and Awards in Glenwood Ballroom**
Crabtree A-D 1:00 p.m. – 2:00 p.m.	**Roll Forming Process: Hidden Insights for Better Engineering Design** Dr Hari Magarabooshanam, Scottsdale Construction System Mahsa Mahdavian, Scottsdale Construction System
Crabtree E-H	**Seismic Design** Karl L. Schroeder, P.E., Devco Engineering, Inc. Kirsten Zeydel, S.E., Nevell Group, Inc.

TUESDAY, MAY 20, 2025

2:00 p.m. – 2:15 p.m.	Break with Sponsors
Crabtree A-D	**Mixed Reality Technology in Steel Construction and Education** Hannah Blum, University of Wisconsin-Madison
2:15 p.m. – 3:15 p.m.	
Crabtree E-H	**All Things Screwed: Don't Bolt on your Connection** Madeleine Grimmer, P.E., Simpson Strong-Tie Company, Inc.
3:15 p.m. – 3:30 p.m.	Break with Sponsors
3:30 p.m. – 4:30 p.m. Glenwood Ballroom	**Keynote** **Strategies for Integrating AI into the Structural Engineering Profession** John-Michael Wong, PhD, S.E., NCSEA Foundation's Innovation in Structural Engineering Grant Team on Artificial Intelligence
6:00 p.m. – 9:00 p.m.	Dinner & Social Event **Pig Pickin' at the Raleigh Beer Garden**

WEDNESDAY, MAY 21, 2025

7:00 a.m. – 5:30 p.m.	Registration at the Lobby
7:00 a.m. – 8:30 a.m.	Breakfast in Glenwood Ballroom
9:00 a.m. – 10:00 a.m. Glenwood Ballroom	**Engineering Ethics: Follow the Rules or Face the Consequences** Fred Mendicino, Faughnan Mendicino, PLLC
10:00 a.m. – 10:15 a.m.	Break with Sponsors
10:15 a.m. – 11:15 a.m. Crabtree A-D	**Radiused Cold-Formed Steel Structure Design** Josh Garton, P.E., S.E., McClure Daniel Linneman, P.E., S.E.,McClure
10:15 a.m. – 11:15 a.m. Crabtree E-H	**Composite Beams and Diaphragms in Steel-Framed Buildings** Matthew R. Eatherton, Ph.D., Virginia Tech
11:30 a.m. – 12:45 p.m.	**Lunch: Award Winner Presentations in Glenwood Ballroom**
1:00 p.m. – 2:00 p.m. Crabtree A-D	**The Growing Popularity of Prefabricated Exterior Skins & Off-Site Construction** Matt Chance, Advanced Exterior Systems
1:00 p.m. – 2:00 p.m. Crabtree E-H	**EQ + Low Embodied Carbon (LEC) = Winning with Sustainable Steel** Adam Shoemaker, ClarkDietrich
2:00 p.m. – 2:15 p.m.	Break with Sponsors
2:15 p.m. – 3:15 p.m. Glenwood Ballroom	**What's Hot on the Hotline?** Roger LaBoube, Ph.D., P.E., Cold-Formed Steel Engineers Institute, Patrick M. Hainault, P.E., R.A. Smith, Inc. Andrew Newland, P.E., ADTEK Engineers, Inc.

WEDNESDAY, MAY 21, 2025

3:30 p.m. – 5:30 p.m.

Crabtree A-D

Emerging Technologies

A Study a Novel Composite Steel Floor System
Benjamin W. Schafer, Ph.D., P.E., Johns Hopkins University

Microsoft .NET Open-Source CFS Steel Codes and Standards
Cris Moen, Ph.D., P.E., RunToSolve LLC
Chu Ding, Ph.D., P.E., RunToSolve LLC

Developing Innovative Cold-Formed Steel Space Trusses
Cheung Yu, Ph.D., University of North Texas

Maximizing Adaptive Reuse with Cold-Formed Steel Frame and Lightweight Structural Cementitious Panels
Frank Pospisil, United States Gypsum, Co.

Automating AISI S100 Direct Strength Method Design Calculations for Arbitrary Cross-Sections: pyCUFSM and ClearCalcs
Brooks H. Smith, ClearCalcs, Pty Ltd.

5:30 p.m. Expo Closes

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MONDAY, MAY 19, 2025: 2:00 PM – 4:00 PM: HOTEL PARKING LOT

CFS – TOOL TIME HANDS-ON DEMO

CONTINUING EDUCATION - 2 PROFESSIONAL DEVELOPMENT HOUR

This CFS interactive workshop will give sponsors exclusive design access a chance to showcase products and network with expo attendees.

Raleigh Marriott Crabtree Valley Hotel Parking Lot
4500 Marriott Drive,
Raleigh, North Carolina 27612

MONDAY, MAY 19, 2025: 5:00 PM – 6:00 PM: GLENWOOD TERRACE/GLENWOOD FOYER

WELCOME RECEPTION

Network with other expo participants at Glenwood Terrace (outdoor venue)

MONDAY, MAY 19, 2025: 6:00 PM – 7:00 PM: GLENWOOD TERRACE/GLENWOOD FOYER

YOUNG MEMBER GROUP MIXER

SPONSORED BY

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TUESDAY, MAY 20, 2025: 9:00 AM – 10:00 AM: GLENWOOD BALLROOM

STATE OF THE STANDARDS

CONTINUING EDUCATION - 1 PDH/ 1 LU

In early fall 2023, the American Iron and Steel Institute (AISI) decided to discontinue their status as an ANSI-accredited Standards Developing Organization (SDO). Standards for the CFS industry were developed and maintained by AISI for over 60 years. With just a few months to explore options, a plan was quickly executed to preserve the CFS construction industry. The AISI standards were transferred to the Steel Deck Institute (SDI), another ANSI-accredited SDO, for safe keeping and to maintain the status of the AISI standards as American National Standards (ANS) Now, a year and a half later, the AISI standards have been distributed among several organizations and work continues on them.

This presentation will give each of the relevant organizations a chance to update designers on which standards they now are in control of, and with what development efforts they are moving forward. There will be ample time allotted for questions from the audience and answers from our panel members.

Session Sponsor

Moderator
Jay Larson, P.E., F.ASCE, SFIA Standards Secretariat (former AISI Managing Director of Construction Codes and Standards)

Panel

- Patrick Ford, P.E., SFIA Technical Director, Chair of SFIA Standards Committee
- Jon Cardin, P.E., MBMA Assistant Director of Research and Engineering
- Christopher Raebel, P.E., AISC Vice President of Engineering and Research
- Thomas Sputo, P.E., SDI Technical Director

Jay Larson, P.E., F.ASCE
Steel Framing Industry Association

Jay Larson started work as a civil/structural engineer for Bethlehem Steel in 1979. After a series of transitions from construction to facilities engineering, to sales engineering he found himself in the construction marketing department for coated sheet steel where he engaged in product, market, business, and standards development activities. In 1991, he became vice chair of the AISI Committee on Specifications where he was responsible for strategic planning and research. In 1998, he helped establish and became the first chair of the AISI Committee on Framing Standards. In 2003, when Bethlehem Steel closed, he moved to AISI and served as secretary of the Committee on Framing Standards until 2008, when he was appointed managing director of the AISI construction technical program. In that capacity, one of his responsibilities was to serve as secretary of the AISI Standards Council, which was the group that oversaw policies, procedures, strategic planning, and ANSI compliance. Jay left AISI at the end of 2023 when the decision was made by AISI to no longer fund activities related to building construction codes and standards. Jay now serves as the SFIA secretariat. In this capacity he monitors and helps guide the SFIA standards development process to ensure compliance with SFIA policies and procedures and ANSI requirements.

Jon-Paul Cardin, P.E.
Metal Building Manufacturers Association

Jon-Paul currently serves as the Assistant Director of Research and Engineering for the Metal Building Manufacturers Association (MBMA). In this position, he assists with directing the technical research and education programs as well as representing MBMA in the national code and standards development arenas. Specifically, Jon-Paul is active on several International Code Council (ICC) codes and standards development committees, including the IBC Structural Code Development Committee, several ASCE 7 subcommittees, and the AISC Standards development committees. Prior to joining MBMA, Jon-Paul served as a Director of Codes and Standards for the American Iron and Steel Institute and managed the engineering department for a steel framing manufacturer. He holds Bachelor of Science degrees in both Civil Engineering (Structural) and Mathematics from the University of Idaho.

Patrick W. Ford, P.E., S.E.
Steel Framing Industry Association

Pat Ford is the Technical Director of the Steel Framing Industry Association (SFIA), and formerly principal of Matsen Ford Design Associates, Inc and a senior staff member of R.A. Smith. He is a registered Professional Engineer in Wisconsin and in numerous other states, and a member of the American Society of Civil Engineers , Association of the Wall and Ceiling Industries - International, and ASTM International. He is also chairman of the SFIA's AISI Framing Standards, and is a past President, Director, and Lifetime Member of the CFSEI. He is an alumnus of the Milwaukee School of Engineering.

Relative to cold-formed steel structural framing, Pat has 45 years of experience that includes applications of the latest technologies and design concepts to load bearing structures and a wide variety of curtainwall and prefabricated systems. His engineering systems design experience includes structural steel, concrete, engineered masonry, wood and other systems in addition to cold-formed steel. He has building credits throughout the country as well as several projects outside the U.S.

His professional experience is broad, and includes principal management and structural engineering design, managing engineering and business development, and code and standards work. Pat has had numerous volunteer associations over the years, and his favorite outside interests include golf, old cars, cards, art and live theatre. Also when in season - cheering on his beloved Green Bay Packers, Brewers and Bucks.

Thomas Sputo, Ph.D., P.E., S.E.
Steel Deck Institute

Thomas Sputo, Ph.D., P.E., S.E. is vice president of Sputo and Lammert Engineering, LLC in Gainesville, Florida, designing and investigating buildings and other structures. He is also the technical director of the Steel Deck Institute. Tom is a Senior Lecturer Emeritus at the University of Florida, where he taught structural design for over 20 years. He has over 35 years of experience in varied areas of structural design, including specialty engineering of manufactured components. He is a licensed professional engineer or structural engineer in 13 states, and a Special (Threshold) Inspector in Florida.

Christopher H. Raebel, S.E, P.E., Ph.D.
American Institute of Steel Construction

Christopher H. Raebel, S.E, P.E., Ph.D., is the Vice President of Engineering and Research at the American Institute of Steel Construction (AISC). His expertise includes structural steel design, steel connection analysis and design, robustness in steel-framed structures, floor vibrations due to occupant activities, and engineering education. Before joining AISC in 2022, Raebel was a faculty member and department chair in the Civil and Architectural Engineering and Construction Management Department at Milwaukee School of Engineering (MSOE) in Milwaukee, Wisconsin.

Raebel holds a B.S. degree in Architectural Engineering from MSOE, an M.S. degree in Architectural Engineering from The Pennsylvania State University, and a PhD. degree in Civil Engineering from Marquette University. He is a licensed professional engineer in seven states and a licensed structural engineer in Illinois.

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TUESDAY, MAY 20, 2025: 10:15 AM – 11:15 AM: CRABTREE A-D

COLD-FORMED STEEL CLASSROOM: FLEXURAL MEMBER DESIGN

CONTINUING EDUCATION - 1 PDH / 1 LU | HSW

The session will focus on the following key areas:

Approved Continuing Education

Design for cold-formed steel framing considers the behavior of flexural members. But such design is complex and involves consideration of the following limit states: bending, shear, web crippling as well as the combinations of these limit states. Complicating the design is the influence of the web punchouts.

The AISI S100 design equations are mathematical models to enable estimation of a limit state. This presentation will review the limit states with a focus on understanding the behavior that is the underlying focus for the AISI S100, North American Specification for the Design of Cold-Formed Steel Structural Members and AISI S240, North American Standard for Cold-Formed Steel Structural Framing design equations.

Reinhold Schuster, Ph.D., P.Eng.
University of Waterloo

Dr. Schuster's contributions as an educator, researcher and specification contributor are unparalleled.

As an educator, Reini created and taught a graduate cold-formed course at the University of Waterloo. But Reini's lecturing transcends the university classroom. He co-developed the AISI one-day cold-formed steel course for practitioners. He and Roger LaBoube presented that course continuously in the United States from 1996 to 2013 under the auspices of AISI, LGSEA and ASCE. Reini also teamed with Dr. Steve Fox and offered the one-day course in Canada under the auspices of the CSSBI. In 2023 Reini and Roger co-developed for CFSEI the update to the AISI one-day course which will be offered as an on-demand course on the CFSEI website. Reini's passion and commitment to education of the cold-formed steel community is unmatched.

Reini's research and creative interests lie in the area of cold-formed steel structures. He supervised a research team that engaged in both experimental and analytical studies. These research efforts developed solutions that have been adopted by AISI and Canadian standards and used by structural engineers engaged in the design of cold-formed steel structures.

Since 1978 Reini has served as the chair of the CSA S136 committee. This is the committee that writes the Canadian cold-formed steel design standard. During this same time Reini has been extensively involved in the AISI Committee on Specifications. Because of Reini's involvement in both committees, the two countries' design specifications remained in sync. In fact, his efforts led to the creation of the North American Specification. He served as the chair of the AISI North American Specification Subcommittee which was charged with harmonizing the design standards across the continent.

Roger LaBoube, Ph.D., P.E.
Cold-Formed Steel Engineers Institute

Dr. Roger A. LaBoube is Curator's Distinguished Teaching Professor Emeritus of Civil, Architectural and Environmental Engineering and former director of the Wei-Wen Yu Center for Cold-Formed Steel Structures at the Missouri University of Science & Technology. Dr. LaBoube holds B.S., M.S., and Ph.D. degrees in Civil Engineering from the University of Missouri-Rolla. He has an extensive background in the design and behavior of cold-formed steel structures. His research and design activities have touched on many facets of cold-formed steel construction, including cold-formed steel beams, panels, trusses, headers, and wall studs as well as bolt, weld, and screw connections. Dr. LaBoube is active in several professional organizations and societies. He served as chairman of the American Iron and Steel Institute (AISI) Committee on Framing Standards and is an emeritus member of the AISI Committee on Specifications for the Design of Cold-Formed Steel Structural Members. He is a registered professional engineer in Missouri.

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TUESDAY, MAY 20, 2025: 10:15 AM – 11:15 AM: CRABTREE E-H

SPECIAL LOADING CONDITIONS FOR COLD-FORMED STEEL TRUSSES

CONTINUING EDUCATION - 1 PDH / 1 LU|HSW

This presentation will highlight special loading conditions encountered in the design of cold-formed steel trusses, with an emphasis on identifying the critical information required to be specified and incorporating the required loading envelope into the cold-formed steel truss design. In addition, conceptual cold-formed steel truss details will be provided along with recommendations on optimizing the design for these special loading conditions. The presentation will focus on wall bracing conditions, fall protection, cupola / steeple conditions, MEP systems and beyond.

In reviewing these special loading conditions for cold-formed steel trusses, a greater awareness and level of attention can be brought to these critical issues to support alignment across the project team of the information required to facilitate the design, the appropriate incorporation of the loading envelope into the cold-formed steel truss design, and a general understanding of the details to integrate these special conditions into the cold-formed steel truss system.

Peter A. Humphrey, P.E.
MiTek

Peter A. Humphrey, P.E is the director of engineering for MiTek's Structural Framing Systems group with over 30 years of engineering and management experience in the building and construction industry. Having practiced consulting structural engineering for 20 years prior to specializing in cold-formed steel on the manufacturing side of the business, Peter provides unique insight and understanding of the industry in support of the MiTek vision to transform the building industry by championing better building methods through the Design-Make-Build approach.

Since specializing in engineering of CFS, Peter has gained extensive experience in cold-formed steel framing design with an emphasis on truss systems and has developed a passion and expertise in new product development, testing and code compliance. His consulting engineering experience includes significant work in educational facilities (K-12 and college/university), commercial and industrial projects, institutional and public

facilities, multi-family housing and senior living projects, as well as restoration and renovation projects.

Peter earned his bachelor's degree in architectural engineering from Penn State University. He is a licensed professional engineer in multiple states.

TUESDAY, MAY 20, 2025: 11:30 AM – 12:45 PM: GLENWOOD BALLROOM

LUNCHEON

CFSEI ANNUAL MEETING AND AWARDS

INSTALLATION OF CFSEI EXECUTIVE COMMITTEE

TOP

TUESDAY, MAY 20, 2025: 1:00 PM – 2:00 PM: CRABTREE A-D

ROLL FORMING PROCESS: HIDDEN INSIGHTS FOR BETTER ENGINEERING DESIGN

CONTINUING EDUCATION - 1 PDH / 1 LU|HSW

AIA Approved Continuing Education

Light gauge steel construction systems are increasingly popular in residential and commercial buildings due to factors like labor shortages, construction costs, and supply chain issues. These systems use cold-formed steel trusses, panels, and connections. Engineers specify member sizes based on the project's load, but sometimes the designs are structurally adequate yet difficult to procure or construct. With new roll-forming sections entering the market, engineers must carefully select the right profiles, considering stiffeners and ribs in the manufacturer's design.

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Session Sponsor

Connection design is another crucial aspect. Modern roll-formers can perform operations like pre-punching, dimpling, coping, flattening, cutting, and notching to ease assembly, either as standalone features or integrated into software systems that ensure structural integrity. Despite these advancements, engineers often specify common sections like lipped channels and hat sections without detailed tolerances or manufacturer-specific information, leading to potential issues. This presentation discusses the best practices including practical insights into roll-forming operations and their impact on strength prediction, as well as key issues like eccentric truss and end-bearing connections.

Dr Hari Magarabooshanam
Scottsdale Construction System

Hari is the Technical Sales Manager at Scottsdale Construction System, with over 10 years of experience in structural engineering. He holds a Ph.D. in Structural Engineering, specializing in cold-formed steel, and assists new and existing customers with onboarding and support within the Scottsdale environment. Hari provides project-specific guidance for the efficient use of cold-formed steel frames, ensuring compliance with various national codes of practice using the Scottsdale methodology.

He is passionate about integrating technology into structural engineering to automate calculations and workflows, helping clients optimize their projects using Scottsdale

software suite. Hari advocates for sustainable construction practices by highlighting the environmental benefits of cold-formed steel, such as recyclability and a lower carbon footprint, assisting clients in meeting their sustainability goals.

Hari also plays a key role in pre-sale conversations, demonstrating the cost-saving advantages of Scottsdale's technology and building strong client relationships. He stays current with industry trends by participating in conferences and workshops, and he is dedicated to sharing his knowledge to advance the field of cold-formed steel.

Mahsa Mahdavian
Scottsdale Construction System

Mahsa is the Technical Marketing Director at Scottsdale Construction System, bringing over a decade of expertise in cold-formed steel products. During her master's studies, she specialized in cold-formed steel shear walls, conducting more than 70 full-scale shear wall tests and developing supporting finite element models. She also researched cold-formed steel clip angles, publishing her findings in AISI Research Reports.

Mahsa began her career in the steel deck products sector as a research engineer focused on new product and market development. In this role, she developed product engineering software and later transitioned into a technical representative engineering role, where she worked closely with engineers to provide innovative solutions to complex challenges. Her contributions to the Steel Deck Institute and the American Iron and Steel Institute have been instrumental in advancing the industry.

Today, Mahsa is focused on promoting the benefits of cold-formed steel and advocating for building durable, efficient structures. Her core principles are: Let the new generation lead, Build with steel, and Make engineering easy. Together, we can achieve stronger, more sustainable structures with cold-formed steel material.

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TUESDAY, MAY 20, 2025: 1:00 PM – 2:00 PM: CRABTREE E-H

SEISMIC DESIGN

CONTINUING EDUCATION - 1 PDH / 1 LU | HWS

Part 1: ASCE 7-22's Effect on Non-Structural Component Seismic Loads

ASCE 7-22 introduces substantial modifications to the way seismic forces on non-structural elements are determined. Are the calculations more difficult? Are the loads higher? What information is needed to determine the loads? How will these modifications affect non-load-bearing CFS interior and exterior framing, along with their connections? This presentation will address these questions and provide advice on what we should tell our contractor clients to anticipate regarding these code changes.

Part 2: Seismic Drift Accommodation of Interior Partitions - Fragility Based Comparison w/ FEMA P-58

Expected performance of interior partitions after a seismic drift event is often not well understood. In some cases, projects will require systems that add construction cost and may not actually offer performance benefit. FEMA P-58 background documents provide useful data that can be used to compare the expected fragility of different drift systems. This presentation will provide an overview of the FEMA P-58 background documentation which can help inform interior partition drift accommodation decisions on projects.

Karl L. Schroeder, P.E.
Devco Engineering, Inc

Karl Schroeder is a Senior Project Engineer with Devco Engineering, Inc and has been with the company since 2006. He has designed the cold-formed steel scope on a wide variety of projects including colleges/universities, military and government facilities, hospitals, schools, airports, museums, stadiums, and various other commercial buildings. Some of his specialized experience includes blast design, Risk Category V seismic design, California HCAI and DSA projects, Alaskan arctic facilities, and sound isolation design. He typically works directly with the contractor, which requires extra attention to constructability and economic solutions for the framing systems.

Soon after graduating from Oregon State University with a Bachelor of Science degree in Civil Engineering, Karl was given an opportunity with Devco Engineering to specialize in cold-formed steel framing. Karl earned his California PE licensure in 2009 with various other states following. From 2009-2016, Karl represented Devco Engineering as a member of the American Iron and Steel Institute (AISI) Committee on Specifications. In 2015, Karl opened a branch office of Devco Engineering in Bozeman, Montana where they continue to serve cold-formed steel focused projects. He is a member of the CFSEI Executive Committee.

Kirsten Zeydel, S.E.
Nevell Group, Inc.

Kirsten Zeydel, S.E. is the director of design at Novell Group Inc. She is a registered structural engineer in California with over 22 years of structural engineering design and management experience. She specializes in cold-formed steel (CFS) design, detailing, and panelization. Kirsten led the structural engineering group at a startup company where she developed a QA/QC process acceptable to OSHPD, and obtained IAPMO product certification for the framing members, sheathed panels, and pre-finished exterior panels. Her extensive experience in CFS design includes a dorm project with nine multi-story CFS load bearing buildings totaling 800,000-sq-ft, and the CFS non-load bearing interior and exterior framing for a 550,000-sq-ft hospital in California. In addition to the engineering side of CFS design, Kirsten has experience with quality programs, product certification, welding procedures, architectural building code requirements and prefinished exterior panels. Kirsten is a former member of the CFSEI Executive Committee. She is also a proud wife and mother of two children who firmly believe that being a mom has made her a better engineer.

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TUESDAY, MAY 20, 2025: 2:15 PM – 3:15 PM: CRABTREE A-D

MIXED REALITY TECHNOLOGY IN STEEL CONSTRUCTION AND EDUCATION

CONTINUING EDUCATION - 1 PDH

AIA Approved Continuing Education

How can we use innovative technology to augment the steel construction industry and educational outcomes for students? This presentation covers the results of a pilot study on the use of mixed reality for structural steel fabrication with the aim of spurring ideas and discussions of how the technology can be modified to benefit the cold-formed steel industry. Additionally, two extended reality teaching aids are presented. One teaching aid is a virtual reality tour of a metal building system where the presentation will focus on the cold-formed steel components of the tour. The second teaching aid is an augmented reality interactive module on bolted steel connections with the aim of demonstrating the capabilities to the audience for future development towards cold-formed steel extended reality teaching aids. At the end of the presentation, the audience will have a better understanding of the capabilities and limitations of extended reality technology in the construction industry and how it might be beneficial to the cold-formed steel industry.

A new method to augment the structural steel fabrication process was developed through a custom mixed reality program using the HoloLens 2 headset. The overall aim is to improve the competitiveness and efficiency of the structural steel industry by reducing costly errors of the fabricated parts. The tool assists the steel fabricator in indicating where and which fabrication operations need to be performed on the steel section using a model of the shop drawings and projecting that model and relevant information as holograms. Viewing the connection with 3D holograms in mixed reality is a significant improvement over 2D images and section cuts to help the technician view in advance what the assembled connection will look like and how all the elements are connected. Additionally, the custom program can be used for quality control purposes before shipping the finished parts to the construction site. It is envisioned this will reduce costly errors and can be widely implemented in various structural steel fabricator shops. The custom program can achieve a 1/16th inch accuracy between the physical steel and the hologram. The program allows the user to select a dimension specified in the design drawings on the overlaid hologram, as well as include a step-by-step tutorial of a fabrication process. This indicates to the user which operations need to be completed to which part of the steel section and in what order. A user interface was developed to display all relevant information needed from the design files.

Furthermore, a means for easily recording information, including pictures and speech, was developed. A full list of developed features includes Validate part manufacturing dimensions; Accurate digital overlay alignment; Dimension inquiry and measurements; IFC file integration, including weld location; Calibration/alignment update; View shop drawings; Table layout for quicker part validation; Place notes on model with voice to text and photo integration; On-device storage of models; Interact / pull-apart model; Step-by-step assembly guide prototype. The features are demonstrated during the presentation.

Hannah Blum
University of Wisconsin-Madison

Hannah Blum is the Alain H. Peyrot Associate Professor in Structural Engineering in the Department of Civil & Environmental Engineering at UW-Madison. Dr. Blum conducts research in the broad areas of Infrastructure Resilience, Next Generation Structural Design, and Advanced Visualization and Extended Reality in Structural Engineering. Her research portfolio encompasses both conventional structural engineering research and collaborative, multi-disciplinary projects. Blum receives funding from federal government sources, industry associations, and individual companies. Dr. Blum has a range of active research on metal structural systems including structural steel, cold-formed steel, and stainless-steel members, steel joist and deck systems, steel framing, metal buildings, and extended reality in structural steel fabrication.

TOP

TUESDAY, MAY 20, 2025: 2:15 PM – 3:15 PM: CRABTREE E-H

ALL THINGS SCREWED: DON'T BOLT ON YOUR CONNECTION

CONTINUING EDUCATION - 1 PDH / 1 LU | HSW

This presentation will focus on the following key areas:

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Screws. They are everywhere and often overlooked. It is likely because they have been entrenched in construction for millennia and so ubiquitous that it is common to find them on the floor of any jobsite. Although these tiny and often-overlooked mechanisms seem simple, in practice the process of specifying them can be complex, often requiring careful considerations in order to ensure proper performance in cold-formed steel (CFS) connections.

From drill points and head types to test data and specifications. This presentation will provide a brief history on the evolution of screws and serve as a basic overview of the most common types of screws for CFS applications, performance characteristics and industry standards.

SIMPSON Strong-Tie®

Session Sponsor

So, please join us for a riveting refresher on all things screwed so you do not have to bolt on your next connection.

Madeleine Grimmer, P.E.
Simpson Strong-Tie

Madeleine is the cold-formed steel Business Specialist for Simpson Strong-Tie. She joined the company as a field engineer in North Carolina in 2017. Madeleine is currently based in Chicago, Illinois and covers the Midwest, Mid-Atlantic and Northeast regions of the U.S. Prior to joining Simpson Strong-Tie, she worked as a structural engineer in the nuclear power industry specializing in seismic studies, blast analysis, nuclear containment design and structural forensics. Madeleine is a registered professional engineer in North Carolina. She earned her Bachelor of Science degree in Civil and Environmental Engineering and master's degree in Structural Engineering from the University of North Carolina - Charlotte.

TOP

TUESDAY, MAY 20, 2025: 3:30 PM – 4:30 PM: GLENWOOD BALLROOM

KEYNOTE SPEAKER

STRATEGIES FOR INTEGRATING AI INTO THE STRUCTURAL ENGINEERING PROFESSION

CONTINUING EDUCATION - 1 PDH / 1 LU

Artificial Intelligence is accelerating change throughout the AEC industry, providing tremendous opportunities for the structural engineering profession's future. Technology is here now, but are you ready to leverage AI for tangible results? This presentation will focus on equipping you with strategies for embracing AI into your workflow. We will address common concerns about AI adoption among smaller and larger firms, and explain how a foundation of learning, strategy, and resources from the NCSEA Foundation can help you to develop, implement, and engage with AI this year.

John-Michael Wong, PhD, S.E.
NCSEA Foundation's Innovation in Structural Engineering Grant Team on Artificial Intelligence.

AIA Approved Continuing Education

John-Michael Wong is serving as the Project Manager for the NCSEA Foundation's Innovation in Structural Engineering Grant Team on Artificial Intelligence. He is an Associate at KPFF Consulting Engineers in San Francisco with 16 years of industry experience in structural engineering design focused on new and existing buildings.

John-Michael completed his PhD in Structural Engineering at the University of California, Berkeley and conducted research on a variety of topics related to design, analysis, lean construction, and computer applications. He formerly taught advanced structural analysis at UC Berkeley and currently teaches structural engineering for senior thesis architecture studio at the Academy of Art University in San Francisco.

TOP

TUESDAY, MAY 20, 2025: 6:00 PM – 9:00 PM

DINNER & SOCIAL EVENT

THE RALEIGH BEER GARDEN WITH PIG PICKIN'

SPONSORED BY

ClarkDietrich BUILDING SYSTEMS

USG STRUCTO-CRETE® BRAND

CFSEI Expo participants will enjoy a relaxing evening at the Raleigh Beer Garden!

Raleigh Beer Garden is a three-time Guinness world-record holder in two categories with 386+ draft beers offered daily.

The North Carolina bar in the first-floor features 144 NC draft taps and the "International" floor offers 222 varieties from the rest of the country and the rest of the world.

Raleigh Beer Garden's rooftop bar features 12 rotating taps alongside the 24-tap system that is in the Beer Garden's event field in the back.

Raleigh Beer Garden will offer enjoyable evening with something for every participant - miniature golf (18 putt putt holes), Fooseball, Ping Pong tables, and Cornholes.

- 5:30 p.m. – Bus leaves the hotel.
- 9:00 pm. – Bus returns to the hotel.

TOP

WEDNESDAY, MAY 21, 2025: 9:00 AM – 10:00 AM: GLENWOOD BALLROOM

ENGINEERING ETHICS: FOLLOW THE RULES OR FACE THE CONSEQUENCES

CONTINUING EDUCATION - 1 PDH / 1 LU

This presentation will provide attendees with a practical understanding of the ethical rules and considerations that govern engineering work and the potential consequences of ignoring them. Attendees will receive an overview of the general standards of ethical behavior engineers should follow in their professional lives. The presentation will explain why ethics matter in engineering and how they can promote a more effective and successful professional experience. Topics will include real-world considerations that can influence decision-making along with a discussion of the consequences of avoiding ethical compliance.

Fred Mendicino
Faughnan Mendicino, PLLC

Fred Mendicino is a graduate of Georgetown University Law Center and a founding member of Faughnan Mendicino, PLLC, a law firm specializing in construction and surety litigation. Fred represents clients from all aspects of the construction world, advising companies across the country and internationally for more than 32 years. He has tried dozens of jury trials, bench trials, and arbitrations throughout his career along with participating in numerous mediations involving construction and surety disputes. He has also presented many lectures for trade associations on topics of interest to the construction industry and was recently appointed to the American Arbitration Association roster of construction arbitrators.

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WEDNESDAY, MAY 21, 2025: 10:15 AM – 11:15 AM: CRABTREE A-D

RADIUSED COLD-FORMED STEEL STRUCTURE DESIGN

CONTINUING EDUCATION - 1 PDH / LU|HSW

This presentation explores the challenges of designing radiused cold-formed steel (CFS) members from a practical engineering perspective. While traditionally used in straight applications, radiused CFS members offer a versatile, lightweight, and cost-effective option for radiused structures, but require careful analysis to ensure adequate strength and performance.

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The session will focus on the following key areas:

1. Curving Cold-Formed Steel Members: Techniques such as stretch forming, crimping, and tabbed assemblies are required to curve CFS members, altering their strength and stiffness compared to standard designs. Presenters will discuss each method's benefits and limitations in various scenarios.
2. Evaluating Projects for Radiused CFS Applications: Radiused layouts are not always practical or cost-effective. This presentation will explore criteria like architectural intent, load paths, framing orientation, and fabrication constraints to assess when radiused CFS members are a good fit. Examples of successful projects will provide a decision- making framework.
3. Capacity and Torsional Behavior: Understanding how radiused CFS members behave under bending and torsion is key to ensuring performance. While torsion can often be avoided, in some cases it is the most efficient option. This presentation will look at how curvature impacts forces, deflection, and member design, focusing on built-up sections.
4. Delegating Design Responsibilities: Designing radiused members involves collaboration among engineers, delegated designers, and fabricators. The presenters will address how to delegate radiused framing by establishing performance criteria and minimum properties to meet your design intent, considering how the manufacturing processes can affect strength and stiffness.
5. Connection Detailing for Curved CFS Members: Detailing connections for curved members poses unique challenges, often exceeding standard detailing practices. This presentation will discuss strategies for handling these non-standard loads and restraints, ensuring connection integrity.

6. Design Examples: A walk-through of the design process for a radiused CFS member will conclude the session, covering manufacturer capacity adjustments, torsional design, and connection detailing.

This presentation will provide practical guidance for engineers working with radiused CFS members, offering insights into design, evaluation, and detailing techniques.

Josh Garton, P.E., S.E.
McClure

Josh is a Project Manager for McClure. He is a licensed structural engineer with 10 years of experience. His design expertise includes multi-story load-bearing cold-formed steel (CFS) structures, industrial structural steel components, non-bearing cold-formed steel systems in both panelized and stick-framed construction and building cladding elements. Josh also has a strong background in radiused, and uniquely shaped structures framed with CFS, developing out-of-the-box solutions for challenges in 3D spaces where traditional details are not effective. As a licensed structural engineer in 10 states, Josh oversees a team of 14 design professionals. He has also led the development of custom cold-formed steel connection design software used by McClure's engineers. Josh has presented with the Cold-Formed Steel Engineers Institute (CFSEI) and through various online webinars.

Daniel Linneman, P.E., S.E.
McClure

Daniel is a licensed Structural Engineer at McClure with nearly six years of experience specializing in multi-story load-bearing cold-formed steel (CFS) structures. As the lead designer on numerous projects, he has developed innovative solutions to complex structural challenges. Daniel's expertise extends beyond cold-formed steel, with significant experience in wood design and a solid background in post-tensioned concrete systems, enhancing his versatility across a wide range of project types. In addition to his design work, Daniel is highly skilled in creating advanced engineering tools, having developed complex Excel spreadsheets to streamline calculations and workflows. He is licensed as a Professional Engineer in four states, including California, he combines technical proficiency with practical problem-solving to deliver exceptional results.

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WEDNESDAY, MAY 21, 2025: 10:15 AM – 11:15 AM: CRABTREE E-H

COMPOSITE BEAMS AND DIAPHRAGMS IN STEEL-FRAMED BUILDINGS

CONTINUING EDUCATION - 1 PDH / 1 LU|HSW

AIA Approved Continuing Education

Composite beams and diaphragms in steel-framed buildings often depend on headed shear studs to transfer load between the steel beam and the concrete filled steel deck. The vast majority of historical tests to determine the behavior of these shear studs have used trapezoidal deck that is no more than three inches deep. A testing program was conducted to understand the strength, stiffness, and ductility of shear studs loaded perpendicular to the flutes of dovetail deck that is 3.5" and 4.0" deep. A pushout test setup was used consisting of two slabs oriented vertically and bearing on the strong floor, each with two shear studs connected to a central steel member that was loaded downward until failure. The testing showed that the behavior of shear studs in dovetail deck can exhibit a different failure mode than trapezoidal deck involving rotation of the rib and that this failure mode was often associated with larger slip at peak load than strong position studs in trapezoidal deck.

HILTI

Session Sponsor

This presentation will analyze the test results and give recommendations for design.

Matthew R. Eatherton, Ph.D.
Virginia Tech

Matt Eatherton is the Montague-Betts Professor of Structural Steel Design in the Department of Civil and Environmental Engineering at Virginia Tech. He conducts research on diaphragms and floor systems in steel buildings, as well as seismic design of steel structures. He is a part of the Steel Diaphragm Innovation Initiative (SDII) www.steeli.org that generated a number of updates to steel deck diaphragm design provisions in recent years. He has seven years of practicing structural engineer experience and fifteen years of academic experience. He has been awarded several honors including the AISC Milek Faculty Fellowship, NSF Career award, AISC Early Faculty Award, ASCE Moissef Paper Award, and the Curry Faculty Fellowship at Virginia Tech.

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WEDNESDAY, MAY 21, 2025: 11:30 AM – 12:45 PM: GLENWOOD BALLROOM

LUNCHEON

AWARD WINNER PRESENTATIONS

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WEDNESDAY, MAY 21, 2025: 1:00 PM – 2:00 PM: CRABTREE A-D

THE GROWING POPULARITY OF PREFABRICATED EXTERIOR SKINS & OFF-SITE CONSTRUCTION

CONTINUING EDUCATION - 1 PDH / LU | HSW

AIA Approved Continuing Education

With a growing number of Owners and General Contractors demanding off-site prefabrication, the Prefabrication Industry has sharpened its approach to the market to ensure that when a Design Assist opportunity arises we provide our expertise to ensure cost and schedule certainty on a project. The adoption of off-site prefabricated assemblies (a.k.a. Technology Enabled Industrial Construction) has grown exponentially in recent years and the prediction is that this is not a short-lived trend, but rather a long-term solution satisfying the appetite for fast-moving projects and mitigating the challenges of a stressed labor market.

With the mindset of designing an engineered CFS "chassis" with unlimited cladding options it is easy to understand the rapid acceptance and utilization of prefabricated exterior skins. Owners and General Contractors simply want the comfort of knowing that the building skin is ready in a prefabricated state and available to install once the building structure is erected.

ARGOS SYSTEMS

Session Sponsor

Having decades of experience with CFS framing, sheathing, air barrier systems and various types of performative aesthetics, Matt will cover some of the basic "must dos" to ensure a positive experience with the integration of prefabricated building skins.

As designs and finish options continue to evolve and challenge the "status quo", it is important to discuss the best practices of the Design Assist process as it relates to prefabricated building exteriors and review some of the key points to ensure success.

Matthew Chance
Advanced Exterior Systems

Matt Chance is a 1988 graduate of East Carolina University with a BS in Construction Management currently serving as an Executive Board Advisor for the Department.

He has over 38 years of experience in the industry. The first 30 with one of the consistently ranked Top 10 specialty and commercial drywall contractors (Precision Walls, Inc.) in the United States serving many different roles with a focus in operations, estimating / sales and business development.

Matt is currently leading one of the subsidiaries of the Parent Company Advanced Exterior Systems (AES) for the last 8 years serving as the COO. The AES Team focuses on commercial cladding (design, manufacturing and installation), EIFS/stucco and exterior prefabricated solutions (design, manufacturing and installation) performing work in the all over the Mid-Atlantic region of the United States.

He is a former board member and Mentor in the local ACE Mentoring Program which exposes high school students to future careers in Architecture, Construction and Engineering.

He is a licensed General Contractor in North Carolina since 1994.

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WEDNESDAY, MAY 21, 2025: 1:00 PM – 2:00 PM: CRABTREE E-H

EQ + LOW EMBODIED CARBON (LEC) = WINNING WITH SUSTAINABLE STEEL

CONTINUING EDUCATION - 1 PDH / 1 LU|HSW

This presentation explores the sustainability of cold-formed steel framing (CFSF), equipping engineers, architects, and contractors to identify and leverage its environmental benefits for competitive advantage. We'll begin by grounding ourselves in the concept of "sustainability." It's about maintaining balance without depleting resources. But how does this apply to CFSF?LEED, a leading green building standard, provides a framework. It outlines criteria across nine categories, with "Materials and Resources" being particularly relevant for CFSF. LEED translates sustainability into actionable guidelines, defining what it means for each building component. We'll build on this established expertise, recognizing that these experts also shaped government specifications for low-carbon materials under the Inflation Reduction Act.

Embodied carbon is a hot topic in sustainable construction. It encompasses the total greenhouse gas emissions generated throughout a material's lifecycle – from production to disposal. This differs from operational carbon, which refers to emissions from a building's daily use. Embodied carbon is a significant contributor to global emissions, making it crucial to address. We measure it using a Life Cycle Assessment (LCA), which tracks emissions at each stage and converts them into metrics like Global Warming Potential (GWP), often called a carbon footprint.

How do manufacturers achieve producing LEC steel products? The key to producing low embodied carbon (LEC) steel framing lies in the supply chain – specifically, the type of steel mill used. Steel from Electric Arc Furnace (EAF) mills has a significantly lower carbon footprint than that from Basic Oxygen Furnace (BOF) mills. Why? EAF mills primarily use recycled steel, bypassing the energy-intensive process of extracting and refining iron ore. This dramatically reduces greenhouse gas emissions. However, we can't rely solely on EAF mills; BOF mills are essential for producing new steel from raw materials, as there isn't enough recycled steel to meet global demand. To ensure your steel products qualify for LEED points or GSA projects, you need an Environmental Product Declaration (EPD). This means sourcing steel from manufacturers who have meticulously gathered lifecycle data and had their EPDs third-party certified.

Want to lower the embodied carbon of your cold-formed steel framing (CFSF)? There are two main ways: by specification or by design. Specification means setting limits. You can require that your CFSF materials have a third-party certified Environmental Product Declaration (EPD) with a Global Warming Potential (GWP) below a certain threshold. Not sure what limit to set? Use the General Services Administration's (GSA) Inflation Reduction Act (IRA) limits as a guide. They've established three performance levels: Industry Average, Top 40%, and Top 20%, withTop 20% representing the lowest embodied carbon options. Design offers another avenue. By strategically using less steel in your building design, you directly reduce embodied carbon. Remember, GWP is measured in metric tons of CO2e per metric ton of steel. A simple way to achieve this is by using EQ CFSF studs, which are lighter than traditional studs but offer comparable strength due to higher ksi steel. For example, a 20-gauge EQ stud can have 35% less embodied carbon per foot than a standard 20-gauge stud. Combine this with LEC CFSF, and you can achieve an additional 30% reduction!

Adam Shoemaker
ClarkDietrich

Adam Shoemaker is the Director of Corporate Sustainability at ClarkDietrich, where he also oversees the Architectural Services Group's interactions with the Construction Specifications Institute (CSI). He has been instrumental in shaping the company's sustainability journey, establishing their GRI-based Sustainability program, culminating in the publication of their first annual Corporate Sustainability Report. Adam's expertise lies in navigating the complex interplay between sustainability, building codes, construction specifications, and green building programs, ensuring ClarkDietrich's product lines and supply chain align with industry best practices and evolving environmental standards. Adam is a LEED AP BD+C and Construction Document Technologist (CDT) certified professional.

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WEDNESDAY, MAY 21, 2025: 2:15 PM – 3:15 PM: GLENWOOD BALLROOM

WHAT'S HOT ON THE HOTLINE?

CONTINUING EDUCATION - 1 PDH / LU

Cold-formed steel (CFS) design typically is not a course topic offered at universities. Therefore, engineers are on their own to self-educate. How? By attending a seminar or webinar on a specific topic. And by getting answers to a specific project questions.

Many engineers take advantage of the highly successful CFSEI "Ask an Expert" page on the CFSEI website or the CFSEI Hotline, 1-800-79STEEL. Inquiries cover the gamut of CFS applications, and we respond to them promptly.

This interactive Q&A session will focus on FAQs and your cold-formed steel design questions.

Hotline topics that may be discussed are:

- Rules of thumb when designing cold-formed steel
- When should an eccentricity be considered when designing stud packs

Plan to attend and participate.

Roger LaBoube, Ph.D., P.E.
Cold-Formed Steel Engineers Institute

Dr. Roger A. LaBoube is Curator's Distinguished Teaching Professor Emeritus of Civil, Architectural and Environmental Engineering and former director of the Wei-Wen Yu Center for Cold-Formed Steel Structures at the Missouri University of Science & Technology. Dr. LaBoube holds B.S., M.S., and Ph.D. degrees in Civil Engineering from the University of Missouri-Rolla. He has an extensive background in the design and behavior of cold-formed steel structures. His research and design activities have touched on many facets of cold-formed steel construction, including cold-formed steel beams, panels, trusses, headers, and wall studs as well as bolt, weld, and screw connections. Dr. LaBoube is active in several professional organizations and societies. He served as

chairman of the American Iron and Steel Institute (AISI) Committee on Framing Standards and is an emeritus member of the AISI Committee on Specifications for the Design of Cold-Formed Steel Structural Members. He is a registered professional engineer in Missouri.

Patrick M. Hainault, P.E.
R.A. Smith, Inc.

Patrick Hainault is the Co-Director of Structural Services at raSmith in Brookfield, Wisconsin. His experience includes engineering design and staff management with raSmith and Matsen Ford Design Associates, Inc., where he was a principal and senior engineer for 21 years. His expertise includes application of the latest technologies and design concepts to a wide variety of primary and secondary structures, including prefabricated systems. His engineering systems design experience includes structural steel, reinforced concrete, engineered masonry and wood. He was a structural designer for a concrete reinforcement supplier and a technician for a national material-testing firm. Hainault is past-chair of the CFSEI Executive Committee, a member of the SFIA Technical Committee and the AWCI Construction Technology Committee. He is a registered Professional Engineer in Wisconsin and several other states. He earned his Bachelor of Science degree in Civil Engineering from Marquette University.

Andrew Newland, P.E.
ADTEK Engineers, Inc.

Andrew has more than 15 years of experience in both cold-formed steel manufacturing and design. He is a Principal at ADTEK Engineers, Inc. and the specialty structural team leader for the Charlottesville, VA, Fairfax, VA, Frederick, MD and Bay City, MI offices, which specialize in the design of load bearing and non-load bearing cold-formed steel framing in low & mid-rise construction as well as cold-formed steel framing and structural ceiling support for Data Centers. Andrew is a member of the ASCE-SEI Committee on Cold-Formed Steel. He is a former member of the American Iron and Steel Institute (AISI) Committee on Specifications. He is a past chairman and current member of the CFSEI Executive Committee and serves as chair of the Technology, Education, and Expo Planning Committees. He is a graduate of Virginia Tech, where he earned a Bachelor of Science degree in Civil and Environmental Engineering and an M.S. degree in Civil Engineering.

WEDNESDAY, MAY 21, 2025: 3:30 PM – 5:30 PM: CRABTREE A-D

EMERGING TECHNOLOGIES

A STUDY A NOVEL COMPOSITE STEEL FLOOR SYSTEM

The objective of this presentation is to study a novel composite steel floor system. These floor systems are part of a proposed nonproprietary, joistless steel floor that can be used for fast assembly in residential or other similar uses. The structural floor system consists of two 3-inch deep, 18-gauge steel decks placed in opposing fashion to form a closed cell, fastened to one another, and then topped with a cementitious panel (USG's STRUCTO-CRETE is utilized) fastened to the upper deck flanges. In addition, a non-structural finish is added to the floor, including LVL adhered to the top of the cementitious panel, and resilient channels and ceiling drywall attached to the bottom of the steel deck.

The tested specimens are 12 feet in length and 32 inches in width and are connected by PAF connectors to supporting beams on shelf angles or seated on girders. The test matrix is composed of six tests, where three are connected to supporting beams by shelf angles and three are connected to supporting beams on girders. Each set of three tests is composed of a bare deck specimen, a composite specimen of deck and cementitious panel, and a composite specimen of deck, cementitious panel, LVL, resilient channels, and ceiling drywall.

Vibration tests were conducted after each step of assembly to understand how accelerations and frequency of the floor change with each additional component. Five accelerometers were utilized to measure the response and variety of vibrational inputs explored. Measured accelerations are compared to tolerances established in AISC Design Guide 11. Additionally, each of these tests were tested for bending capacity and composite action. The composite action aims to achieve higher flexural performance, including bending capacity, bending stiffness, and floor vibration characteristics. Focusing on the bending capacity each of the six specimens were tested in a four-point bending rig with a nominal total span of 12 feet.

All the specimens exhibit local buckling in the cold-formed steel decks prior to reaching ultimate strength. The addition of the cementitious panel to the top flange increases the stiffness, increases the strength, and improves the post-peak strength of the assembly. The addition of non-structural floor finish and resilient channels and gypsum board for the ceiling assembly are not observed to have a significant structural influence. Comparison to design methods is underway, as are additional improvements to the end detailing and other features of the proposed system. Future work aims to look at other floor assembly systems, including different end details to the supporting beams and using a "6-inch-deep deck" (instead of two 3-inch decks) to construct a similar specimen.

Benjamin W. Schafer, Ph.D., P.E.
Johns Hopkins University

Benjamin Schafer, Ph.D., P.E., F. SEI is the Hackerman Professor of Civil and Systems Engineering and the Director of the Ralph O'Connor Sustainable Energy Institute at Johns Hopkins University. He is an active volunteer and leader on multiple national committees related to the engineering and design of steel building structures. He has won multiple awards for his research, teaching, and speaking and currently resides in Washington D.C. with his wife and son.

WEDNESDAY, MAY 21, 2025: 3:30 PM – 5:30 PM: CRABTREE A-D

EMERGING TECHNOLOGIES

MICROSOFT .NET OPEN-SOURCE COLD-FORMED STEEL CODES AND STANDARDS

A Microsoft .NET open-source AISI S100-16 package written in the building construction industry favorite C# programming language is now available for any person or company around the world who is developing cold-formed steel design software.

AIA Approved Continuing Education

This version of AISI S100-16 is 'machine-readable' and defines classes and methods for each equation. A software developer can conveniently call this package and use its methods or functions. Optimized for production, the output of each function call contains direct references to the AISIS100 equations used. Thorough unit testing of each equation is provided to give confidence and demonstrate accuracy. Updates and revisions can be easily implemented and distributed with git version control.

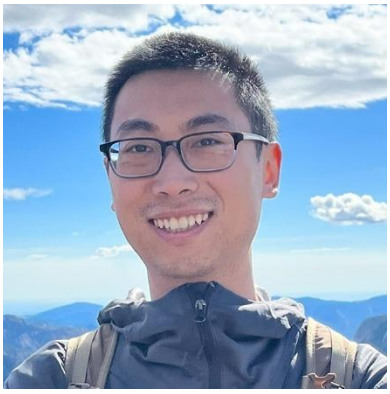
Providing machine-readable versions of codes and standards should be a top priority for governing code bodies and industries like cold-formed steel framing to support the growing demand for design and analysis automation. Fast, reliable, accessible software drives market opportunity. This presentation will provide a high-level summary of the software package and show some implementation examples.
https://github.com/runtosolve/AISIS100.cs.

Cristopher D. Moen, Ph.D., P.E., F.SEI
RunToSolve LLC

Cris Moen is CEO and President of RunToSolve LLC, a software R&D company founded in 2019 that specializing in structural system analysis and design automation.

Cris started his career as a bridge engineer at J. Muller International (1997-2002) and Parsons Corporation (2002-2004). He completed his Ph.D. at Johns Hopkins University (2004-2008) focusing on thin-walled structures and cold-formed steel, working up to Associate Professor at Virginia Tech (2008-2016), and since 2017 has served as a part-time faculty member at Johns Hopkins University. From 2013 to 2018 Cris was CEO of NBM Technologies, Inc., an academically-rooted engineering consulting company that completed over 100 projects across building construction, solar, and aerospace industry sectors.

Chu Ding, Ph.D., P.E.
RunToSolve LLC



Chu is a consultant at RunToSolve, LLC. He has years of design experience in light-frame construction and specializes in engineering software development. He has developed his expertise in advanced high strength steel from his PhD research at Johns Hopkins University. As a licensed Professional Engineer, he has been involved with several high-profile mix-use/multi-family projects in DC metro region including The Wharf DC and The Parks at Walter Reed. He enjoys exploring and implementing new technologies in AEC space and is a member of the winning team at 2024 AEC Tech Hackathon at NYC.

WEDNESDAY, MAY 21, 2025: 3:30 PM – 5:30 PM: CRABTREE A-D

EMERGING TECHNOLOGIES

DEVELOPING INNOVATIVE COLD-FORMED STEEL SPACE TRUSSES

This presentation presents pioneering and innovative research work with direct applications aimed at improving the structural performance of roof trusses with cold-formed steel (CFS).

AIA Approved Continuing Education

The proposed product, Space (3D) trusses made from cold-formed steel profiles, seeks to enhance safety through their rigidity in three dimensions. Conventional 3D steel trusses are typically constructed from hot-rolled steel bars, often utilizing tubes connected by bolts at the nodes. While several types of connections are available to attach these members, most are patented and costly. In the pursuit of a structurally viable and cost-effective alternative to hot-rolled steel, cold-formed steel (CFS) emerges as a strong candidate.

CFS is primarily manufactured from steel plates, sheets, and strips, offering numerous advantages, including ease of fabrication, transport, and installation. This study aims to develop a practical product: 3D CFS trusses, designed to create safer structures through their enhanced rigidity and more economical designs by minimizing the need for stabilization elements.

A novel technique for limiting axis eccentricity was developed, along with a unique joint configuration that allows CFS sections to replace bars in a 3D truss. Additionally, a formula for calculating eccentricity correction was formulated and applied to CFS 3D trusses. To validate the concept and efficiency of the proposed 3D CFS truss, a prototype with an area of 43.0 ft² (external dimensions of 6.56 ft x 6.56 ft) was constructed and analyzed. The prototypes were evaluated through finite element models and experimental tests. The CFS structure exhibited outstanding results, with a self-weight of 182 lb compared to a load capacity of 16,142 lbf, which is 88 times greater. From these findings, it is concluded that the proposed space CFS trusses hold significant potential for application in building construction.

Cheng Yu
University of North Texas

Cheng Yu, Ph.D., P.E., F.SEI, F.ASCE, is a professor in the Department of Mechanical Engineering at the University of North Texas. Dr. Yu's research focuses on structural engineering and construction technology, with an emphasis

on developing design methods, transformative technologies, and novel structures to enhance the resilience and sustainability of civil structures. His research programs have received funding from the federal, state, and industrial sponsors. Dr. Yu is a registered professional engineer, an ASCE Fellow, and an SEI Fellow. He was the recipient of the Faculty Early Career Development (CAREER) Award from the National Science Foundation.

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WEDNESDAY, MAY 21, 2025: 3:30 PM – 5:30 PM: CRABTREE A-D

EMERGING TECHNOLOGIES

MAXIMIZING ADAPTIVE REUSE WITH COLD-FORMED STEEL FRAME AND LIGHTWEIGHT STRUCTURAL CEMENTITIOUS PANELS

AIA Approved Continuing Education

Cold-Formed Steel (CFS) frames offer a versatile, lightweight, and sustainable alternative to traditional building materials. Used in conjunction with structural cementitious panels, CFS structural systems are a fast and inexpensive solution for adaptive reuse renovation projects. They can be seamlessly integrated quickly into existing structures without adding significant weight or requiring extensive foundation reinforcement, a key consideration when working with older buildings.

This presentation highlights the use of CFS with light-weight structural cementitious panels in various renovation applications, including the adaptive reuse of existing older buildings. The CFS/cementitious panel system will be briefly outlined with new emerging real-world applications and examples.

FRAMECAD

Session Sponsor

Frank Pospisil
United States Gypsum, Co.

Frank Pospisil has worked with the USG STRUCTO-CRETE® Brand Structural panels since their launch in 2006. He has led or been involved in the sales, marketing, application development, testing and certification of the various system fire and acoustic ratings, as well as in the development of the panel structural capacities. He is a structural engineer registered in the province of Ontario, Canada and holds an MBA in International Marketing.

WEDNESDAY, MAY 21, 2025: 3:30 PM – 5:30 PM: CRABTREE A-D

EMERGING TECHNOLOGIES

AUTOMATING AISI S100 DIRECT STRENGTH METHOD DESIGN CALCULATIONS FOR ARBITRARY CROSS-SECTIONS: PYCUFSM AND CLEARCALCS

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Cold-formed steel (CFS) cross-sections with complex stiffeners, non-square bends, and even wholly arbitrary shapes are becoming increasingly popular and normalized, yet accurate design calculations for them are still plagued with a level of complexity that can be prohibitive for many engineers who have not explicitly specialized in CFS. Engineers often fall back to utilizing simpler design tools such as span tables and various simplified design standards such as AISI S230. While such designs are safe, they can also be over-conservative by upwards of 20%, especially for non-simply supported conditions, which can lead to a mistaken belief that CFS is less competitive as a material choice. A simpler means of performing a full design to AISI S100, using the modern Direct Strength Method, is imperative for wider adoption of CFS throughout the United States and internationally.

The Direct Strength Method, integral to AISI S100, typically requires a finite strip analysis, for which only a few software tools exist, and then interpretation of a signature curve that is rarely as clear-cut as the examples in the AISI S100 commentary. While some manufacturers have begun publishing critical local and distortional buckling moments (Mcrl and Mcrd), these are not universally available and are irrelevant for custom roll-formed sections. A highly-performant, open-source Python software package, pyCUFSM, has been developed - based heavily upon the long-standing and trusted Matlab CUFSM - and amended to include automated determination of the critical buckling moments Mcrl, Mcrd, and Mcre (and their axial force equivalents). Utilizing C-language compilation and optimized corner node identification, performance was enhanced such that 90% of analyses are completed in less than 3.9 seconds on tested modern laptops or web servers. The automated buckling parameter calculation was found accurate in over 90% of tested cross-sections, and conservative in the remainder. However, even with quick determination of the critical buckling parameters, full AISI S100 CFS design calculations are still complex and not accessible for all engineers or architects, especially those more accustomed to wood design.

Full AISI S100 calculations have traditionally been performed using spreadsheets or math worksheets, though these are difficult to publish in a robust and validated manner to large numbers of users, and difficult to include many design scenarios in a unified calculator. A compiled pyCUFSM package has been deployed to auto-scaling web servers and integrated into a flexible calculation builder platform on ClearCalcs.com, resulting in a

simple and reusable calculator for designing customized CFS cross-sections for arbitrary load and support conditions. A calculator was developed which requires only 4 inputs though with the option of fine-tuning other options such as web holes, various configurations of restraints and stiffeners, and optionally excluding inelastic reserve capacity. Extensive validation has been performed using the same DSM validations as the original CUFSM as well as several additional textbooks and design guides. The extensibility of both pyCUFSM and the ClearCalcs calculation builder is demonstrated for wide-scale sharing, publishing, and API integration of calculators by both researchers and design engineers, facilitating simple usage of both standards-compliant and novel research-based design approaches by the wider structural engineering community.

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Brooks Smith, P.E., CPEng, is a structural engineer with a passion for both research and software development, and a vision for making structural design safer, easier, and more efficient. He is the current Head of Engineering Research & Development at the Melbourne, Australia head office of ClearCalcs, a cloud-based platform providing structural design calculators to the USA, Canada, Australia, New Zealand, and Europe. In his free time, he is also an active member of the open-source software community and is the lead maintainer of FEA package anaStruct and FSM package pyCUFSM.

Prior to joining ClearCalcs, Brooks's comprehensive background includes post-graduate research in the system behaviour of CFS, forensic engineering consulting, and speciality consulting in CFS product development. While he has lived in Australia for the last 7 years, he grew up in the United States, earning his Master of Science in Civil Engineering from the University of Massachusetts, Amherst, and his dual bachelor's degrees from Dartmouth College and its Thayer School of Engineering.

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