Newsletter for the *January 2005*

Light Gauge Steel Engineers Association

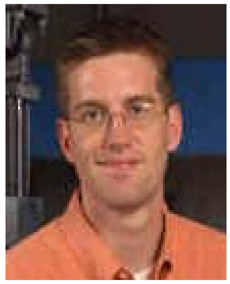
Inside *page*

Upcoming Events

Association of the Wall and Ceiling Industries, International (AWCI), trade show and convention	Mar 29 - April 3
LGSEA committee meetings, in conjunction with PCBC in San Francisco	May 31 - June 3
LGSEA committee meetings, in conjunction with METALCON in Chicago	Oct 4-6

Buckling Effects on Cold formed Beam Strength

By Benjamin W. Schafer, Johns Hopkins University



To better understand the strength of cold-formed steel beams in bending, and separate the effects of local and distortional buckling, researchers at Johns Hopkins University (JHU) performed experiments and conducted detailed analysis on industry standard C and Z members with specifically developed restraint conditions for the compression flange. The work was sponsored by the American Iron and Steel Institute (AISI) and the Metal Building Manufacturer's Association (MBMA), and included material donations from major wall stud manufacturers. The results indicate that existing AISI provisions work well when local buckling occurs, but can be unconservative when distortional buckling occurs. New provisions for distortional buckling are under development in the AISI Committee on Specifications.

As a cold-formed steel C member undergoes bending three basic instabilities must be considered: local, distortional, and lateral-torsional. Local buckling involves bending of the plates that make up the cross-section. In design, reductions from the actual width to the effective width are generally related to local buckling considerations. Lateral-torsional buckling involves bending and twisting of the entire cross-section. In design, lateral-torsional buckling is handled by a simple beam curve, and additional reductions are accounted for by using effective properties to determine the section modulus.

Distortional buckling, sometimes also known as stiffener buckling, involves both bending and membrane deformation in the section. If the lip stiffener is too small the flange and lip stiffener will buckle together. In design, distortional buckling is accounted for by additional reductions in the effective width, calculated by determining the ratio of the stiffener moment of inertia to the adequate stiffener moment of inertia and reducing accordingly. These reductions were found to be inadequate if the compression flange was completely unrestrained.

Fig. 1 Four point bending test setup

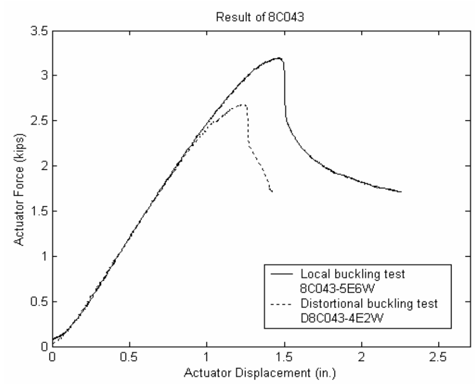


Fig. 2 Load vs. displacement for local vs. distortional buckling tests

In the past, experimental research did not explicitly distinguish between local and distortional buckling. In the tests conducted at JHU great care was taken to separate these two failure modes. Simple four point bending tests were conducted and two series of tests performed. In the "local buckling tests" the compression flanges were restricted

(Continued on page 5)

Newsletter for the

Light Gauge Steel Engineers Association

The President's Corner

Reynaud Serrette, Ph.D.

Happy New Year! I hope you had an enjoyable holiday with family and friends, and an opportunity to recharge yourselves.

In 2004, LGSEA faced many challenges/opportunities that required enormous expenditures of time and effort by the Board of Directors. On behalf of the entire membership, I want to thank each member of the Board for their steadfast commitment to the well-being and growth of the LGSEA. Our technical committees were and continue to be very active, with the Fastener/Connector Committee taking on new leadership (Greg Greenlee is the new chair). A new set of Bylaws were adopted. The new Bylaws better focused LGSEA's mission and operations, and simplified the membership structure. The Board also initiated a process to enhance the quality of services to members and bring new product developments and innovations to the attention of members (see the new ***"Product Exchange Section"*** of this newsletter).

Looking back over the past quarter I would like to highlight the following areas of growth and achievement.

1) ***Technical Publications*** have increased in number and the Newsletter has grown in size and technical content. New Technotes are now available including Slip Connectors, Steel to Wood Fastener (pending publication), and Permanent Truss Bracing to name a few. Other Technical Notes that are in the process of being completed include Clip Angle Design, Slip Track Design, Sheathed Shear Wall Design, X-bracing Design, and the Design of Gusset Plates.

2) ***Educational programs*** have increased as LGSEA continues to work on educational programs for building inspectors, engineers, and architects. The LGSEA Mid-rise Building Seminar has fast become a popular well attended seminar. Eight LGSEA members gave presentations at Metalcon in 2004. Numerous LGSEA chapter seminars have been given as well.

3) ***Research*** activity and involvement have increased as LGSEA continues to play a lead in the development and support of research aimed at enhanced CFS engineering and construction. Sheathed shear walls, shear walls with adhesives, deep leg L-headers, and gusset plate research have been some of the highlights in 2004.

4) ***Organizational efforts*** have increased by the LGSEA Board. New, more effective Bylaws were approved by the membership. A new 5 year strategic plan is being developed to keep the association responsive to the needs of the CFS community.

In 2005, the Board intends to build upon the momentum of 2004 through increased collaborative efforts with other cold-formed organizations. As I reflect back over the past 10 years and I look to the future, I am reminded of how LGSEA members have become involved in multiple cold-formed steel building industry organizations. Our involvement with these organizations has been a benefit to both the LGSEA and the other related organizations. As we move forward and reach out to other organizations, LGSEA will continue to be a grass roots engineering association that provides its membership with a forum to discuss engineering issues and to address these issues via Technical Notes, Research Notes, Newsletters, Seminars and peer-to-peer dialogues.

I want to extend a special note of thanks to the SFA for providing support for LGSEA's day-to-day operations.

The Board welcomes ideas and comments you may have on any issue related to LGSEA. You may contact me directly at clfsr@scu.edu or by phone at 408-554-4061.

To all our sponsors and those who have given so much to support LGSEA, THANK YOU! We look forward to your continued support. To you my fellow members, may you all have an extraordinary 2005! ❒

Membership Approves Revised Bylaws

By Dean Peyton, PE, LGSEA NL Editor

In 1994 the LGSEA was founded to bring together engineers, architects, researchers, contractors, manufacturers, educators, suppliers, and fabricators who were interested in the design and construction of cold-formed (light gauge) steel structures. LGSEA's mission was simple: At a grass roots level, to bring together a membership of diverse specialties to better serve the cold-formed steel framing industry.

In October 2004 the LGSEA membership voted to approve the revised set of Bylaws. The new bylaws do not change the mission of the LGSEA. The bylaws do, however, recognize that many changes have taken place in the CFS industry since 1994. There is a need for a cadre of engineers with expertise and experience in both the technical and construction areas of CFS design, and the revised bylaws encourage collaborative ventures for the advancement of the state of CFS engineering (see mission insert this page).

Shortly after inception, the LGSEA desired to make improvements to the bylaws, to make them more "operationally effective" in the day to day affairs and mission of the LGSEA. The majority of the changes, in the new Bylaws, pertain to administrative functions. Requirements for the Board of Directors (BOD) have not changed. The (7) member professional engineering controlled BOD is comprised of (5) professional engineering members and (2) associate members as elected by the membership. The revised bylaws now allow for any member of the BOD to be elected as an officer, but the BOD continues to be controlled by a 71% margin of professional engineers. General membership controls BOD elections and professional engineers have majority control on the BOD. This BOD structure has served the LGSEA well by limiting the action that can be taken by any single member of the BOD. Members may view the bylaws on the LGSEA web site. The LGSEA would like to give a special thank you to Howard Lau, Ken Vought, and the by-law committee for their tireless efforts to revise the bylaws and present them to membership for approval. ❐

Our LGSEA Mission is:

- To advance the state of engineering knowledge as it pertains to the cost effective design and construction of cold-formed steel structures and systems.
- To promote, support, direct and conduct research for the technical advancement of cold- formed steel materials and construction.
- To develop, compile and publish technical information of benefit to users of structural cold- formed steel materials.
- To cooperate in every lawful way in the adoption and maintenance of engineering standards, specifications and model codes for the design, fabrication and installation of structural cold- formed steel materials.
- To provide engineering and related technical education through seminars, publications, meetings and any other appropriate program or media.
- To develop practical and effective construction techniques.
- To support programs, education and other activities at universities, related associations and companies that further the proper engineering and design of structural cold-formed steel materials and /or the pursuit of increasing the use of structural cold- formed steel materials.

The Light Gauge Steel Engineers Association needs you and your experience. Please mail or fax your opinions, questions, and design details that are relevant to the light gauge industry (fax to ***(253) 941-9939****). Upon editorial staff review, your submission may be printed in the Technical Exchange Section of this newsletter.*

Specifying Screws Per the 2001 North American Specification Highlights Need for Manufacturers to Publish Tested Screw Capacities

Matt Eiler, PE - Anderson-Peyton Structural Engineers, Seattle, WA

The issue of calculating the allowable design value for a screw connection per the AISI specification was addressed in the October 2001 LGSEA Newsletter "Specification of Screw Fasteners" article. The article was in reference to the 1996 Edition of the AISI Specification in which section E4.3.2 *Shear in Screws* required that the nominal shear strength of the screw itself shall not be less than 1.25*Pns (where Pns = calculated nominal shear strength per screw of the assembly per section E4.3.1). This requirement was intended to ensure that the screw itself was not the controlling (brittle) failure mode of the connection. Based on a review of screw manufacturers limited test data it was found that the nominal tested screw shear capacities could not always meet 1.25 times the calculated nominal shear capacity for thicker members. Therefore it was suggested that the designer work backward from the nominal tested screw capacities to determine an allowable shear capacity for the screw connection.

Calculating the allowable design value for a screw connection per the North

(Continued on page 5)

TABLE #1 (Anderson-Peyton Proposed Modified Screw Capacity)

ALLOWABLE SHEAR & PULLOUT VALUES

FOR A SINGLE SCREW CONNECTING LIGHT GAUGE STEEL[1,3,5]

NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD-FORMED STEEL MEMBERS

AISI Standard - 2001 Edition - Section E4 and Nominal Screw Test Strength[7]

			#8 screw		**#10 screw**		**#12 screw**	
Nominal Screw Strength Test Data[6]								
Ps screw test (Nominal Strength) =			**900**	**1615**	**1500**	**2515**	**2250**	**3665**
Allowable Value 0.8*Ps test / FS[7]=			**240**	**431**	**400**	**671**	**600**	**977**
			DIA.[4] = 0.164		DIA.[4] = 0.190		DIA.[4] = 0.216	
Thickness MILS	**Design Thickness[5]** INCHES	**Material Ultimate Strength[2]** F_u, (KSI)	**V** SHEAR (LBS)	**T** PULL-OUT (LBS)	**V** SHEAR (LBS)	**T** PULL-OUT (LBS)	**V** SHEAR (LBS)	**T** PULL-OUT (LBS)
18 (25 GA)	0.0188	45	66	39	71	46	75	52
27 (22 GA)	0.0283	45	121	59	131	69	139	78
33 (20 GA)	0.0346	45	164	72	177	84	188	95
43 (18 GA)	0.0451	45	**240** ***(244)***	94	263	109	280	124
54 (16 GA)	0.0566	65	**240** ***(496)***	171	**400** ***(534)***	198	569	225
68 (14 GA)	0.0713	65	-NA-	-NA-	**400** ***(755)***	249	**600** ***(805)***	284
97 (12 GA)	0.1017	65	-NA-	-NA-	**400** ***(1130)***	356	**600** ***(1285)***	405

Footnotes for Table #1

1. *Shear is calculated per AISI/NASPEC E4.3.1, Pull-Out per E4.4.1, and Pull-Over per E4.4.2*
2. *All values are based on connected parts having a minimum stress of Fy=33 ksi and Fu=45 ksi for 43 mils (18 GA) and thinner and a minimum stress of Fy=50 ksi and Fu=65 ksi for 54 mils (16 GA) and thicker, unless otherwise noted.*
3. *All values are based on equal thickness and material properties of connected parts and a factor of Safety = 3.0 for the assembly.*
4. *All screw diameters are based on AISI/NASPEC Commentary Table C-E4-1 Nominal Diameter for Screws. Screw head or washer diameter shall be a minimum of 5/16 inch.*
5. *Minimum Thickness represents 95% of the Design Thickness and is the minimum acceptable thickness delivered to the job site based on Section A2.4 of the AISI/NASPEC 2001 Edition.*
6. *The example nominal screw test values indicated are based on the minimum test data of three national manufacturer's screws as tested at Santa Clara University (report and testing in progress). Nominal screw test data should be obtained from the screw manufacturer or independent laboratory testing for the screws that are being specified.*
7. *Allowable Screw Values are based on Section E4.3.3 for shear and Section E4.4.3 for tension with a Factor of Safety = 3, where sufficient number of test results are available, an alternative Factor of Safety may be determined according to Chapter F of the specification.*

(Continued from page 4 -Specifying Screws)

American Specification for the Design of Cold-Formed Steel Structural Members (2001 Edition) is essentially the same as the 1996 Edition. However, definitions for the tested nominal strength of the screw have been added, and section E4.3.3 *Shear in Screws* has been revised to indicate that the nominal shear strength of the screw connection, Pns, shall not exceed 0.8*Pss (where Pss = tested nominal strength of screw). This has helped to clarify the intent of the specification which is to avoid the brittle and sudden shear fracture of the screw. Unfortunately the nominal tested strengths of screws per the AISI test protocol for screws are not readily available from most screw manufacturers. Therefore engineers must attempt to gather this information from each individual screw manufacturer and/or back calculate the nominal strength of the screw assembly from the manufacturer's allowable capacities which are typically available but usually do not indicate whether the connection was controlled by failure of the assembly or fracture of the screw itself. Currently per the specification it is the responsibility of the designer to search for or determine the nominal tested strength of screws.

Our office has found that this can be a difficult task. The approach this office currently uses is based on preliminary strength values from testing and a report that is in progress at Santa Clara University based on test data of three national manufacturer's screws and following the AISI test protocol for screw strength.

Table 1 provides calculated allowable shear and pullout values of screw connections considering the tested nominal strength of the screws per the preliminary test results from Santa Clara University. The non-shaded cells are allowable screw connection assembly values that are not limited by the strength of the screw and are calculated per section E4.3.1 for shear and section E4.4.1 for pull-out. The shaded cells indicate tested strengths and allowable values that are controlled by the tested strength of the screw rather than the calculated assembly (within the shaded cells, the calculated assembly allowable values are shown in brackets ***( )*** below the allowable values controlled by tested strength); . Example: A #10 screw connecting 54 mil members (Grade 50) has a calculated allowable capacity of 534 lbs per screw based on section E4.3.1; however, the tested shear strength of a #10 screw is approximately 1500 lbs and therefore the allowable shear strength of the screw connection based on section E4.3.3 is Pa = 0.8*1500 lb/3.0 = 400 lbs per screw. This example conservatively uses a Factor of Safety = 3.0 on the screw strength; however, when using tested screw strength data from a manufacturer or independent laboratory testing, the Factor of Safety may be determined according to Chapter F and increased allowable values might be possible. For example determining the Factor of Safety based on test data according to Chapter F may result in a FS = 2.52 which would give Pa = 0.8*1500 lb/2.52 = 476 lbs per screw for the #10 screw above.

In order for designers to calculate the allowable capacity of screw connections per the specification, screw manufacturers need to provide nominal shear and tension strength values for their screws along with the corresponding factor of safety per Chapter F of the specification. This would allow engineers to determine the most accurate allowable capacities per the intent of the specification. ❒

(Continued from page 1 - Schafer)

with through-fastened panels that were specifically detailed to eliminate distortional buckling. In the "distortional buckling tests" nominally identical specimens were tested, this time with no restriction of the compression flange, as shown in Fig. 1. Results, as demonstrated in Fig. 2., were generally dramatic. If distortional buckling is free to form, a significant reduction in strength is observed. The average reduction from the AISI predicted capacity was 17% when distortional buckling was free to form.

In practice the situation is usually not as drastic as in the controlled testing. This is due to two issues (1) some restraint (due to sheeting or otherwise) often exists on the compression flange and (2) when no restraint exists the unbraced length is usually long enough that lateral-torsional buckling, not distortional buckling, controls. In the testing, lateral-torsional buckling was specifically eliminated so that distortional buckling could be examined in isolation. Therefore, the testing intentionally represents a rather extreme situation; nonetheless, the behavior is important and new provisions to account for distortional buckling are under development in the AISI Committee on Specifications.

More detailed reports related to this research can be found online at www.ce.jhu.edu/bschafer. In addition, papers have been published at the 2002 and 2004 Specialty Conference on Cold-Formed Steel Structures, and in the Journal of Structural Engineering (full references available online). ❒

LGSEA Celebrates 10 Year Anniversary in Vegas

Speaker Don Moody

In October the LGSEA celebrated its 10 year anniversary with a luncheon at the METALCON Convention held in Las Vegas. The featured speaker was Don Moody, PE, past president of the Steel Framing Alliance and current General Manager of Nuconsteel Commercial Corp. He gave an inspiring presentation outlining what LGSEA has done for the engineering community and for industry manufacturers. Moody recounted the history of the Association. Starting with just 9 engineers in December of 1993, then recognized as an organization in April of 1994, the LGSEA has grown to over 1200 members. The LGSEA is the only cold-formed steel engineering association which blends a mix of industry representatives with professionals in order to better serve the cold-formed framing industry. Committee meetings offer a forum for professional engineers and architects along with contractors and manufacturers to better address safe code design and research needs to support cutting edge construction methods.

Don Moody addresses a full house at the LGSEA Luncheon

Special thank you plaques are awarded to our 2004 sponsors. From left to right attending sponsors were: John Carpenter (Alpine), Ken Vought (USS-Posco founding Sponsor), Art Linn (Simpson Strong-Tie), Augie Cisco (SSMA), Don Allen (SFA)

Moody praised the LGSEA for their value to conventions like METALCON. 2004 was a banner year in regards to attendance, number of booths, and the number and quality of seminars. LGSEA members played a significant role in that they were asked to give eight presentations at METALCON.

Recognition was given to the LGSEA's Committee Meetings held during METALCON, as they were an outstanding success. Great progress was made on current and new technotes. See the LGSEA web site for meeting minutes.

The anniversary luncheon celebration far exceeded our expectations. We had an overwhelming turnout for the event which began with a delicious "Around the World Buffet" with all the trimmings, including a prime rib carving station. Needless to say, no one went away hungry.

Following Moody's presentation, awards were given to recognize and to honor those individuals and firms that:

1. Founded LGSEA.
2. Sponsored LGSEA.
3. Helped LGSEA to grow, expand, & improve cold-formed steel design.
4. Helped to educate the cold-formed steel design community.
5. Conducted needed research for cold-formed steel design.

The LGSEA is recognized as the group most responsible for increasing the number of design professionals competent in

(Continued on page 7)

Special thanks to Tool/Fastener/Connector Manufacturers for their contributions from left to right are: David Nolan (ET & F), Gary Rolih (Senco), Art Linn (Simpson Strong-Tie), Hans Bergkvist (Attexor), Al Toback (Henkel), John Tillman (ET & F)

Some current & past Board members from left to right: Tim Waite, Howard Lau, Don Allen, John Lyons, Dean Peyton, Nader Elhajj, Pat Ford, Ken Vought, Reynaud Serrette.

Special thanks for Roll Formers & Distributors from left to right: Greg Ralph (Dietrich), Tom Porter (CEMCO), Don Moody (Nuconsteel), Gary Johnson (Elixir)

Chapter Presidents: Zsolt Nemedi and Michael Kasamoto

(Continued from page 6)

the design of "cold-formed steel framing". This has helped increase market share in residential and light commercial construction.

The photos in this article identify only some of the award recipients. Many other individuals could not be present at the luncheon to accept their awards. Please visit our web site for a complete Honor Roll List thanking all who have contributed to the LGSEA and cold-formed steel framing.

LGSEA is pleased and honored to have served our members and others over the past 10 years, and we eagerly look forward to serving our membership in the years ahead.

Finally, a special thanks to Howard Lau, Ken Vought, Dean Peyton, and Don Allen for making the 10 year anniversary a special event. ❒

Outstanding Contributions in Cold-formed Research awards were presented to Nader Elhajj and Dr. Reynaud Serrette.

Howard Lau and Ken Vought

LGSEA Announces New Sponsorship Packages for "Product Sharing"

The LGSEA recently approved a new sponsorship policy that allows its sponsors to share information about their products in a ***"Product Exchange Section"*** of the newsletter. This section will allow our LGSEA engineering members to obtain first hand technical information from sponsor members who would like to share existing or newly developed technical product information. Our web site will explain this new policy. If you have any questions on this policy and how your firm could share important product information with the engineering community, call Dean Peyton @ (253) 941-9929.

News Briefs

Errata on Prescriptive Method Now Available

On September 29, 2004, the AISI Committee on Framing Standards (COFS) released "Errata to the Standard for Cold-Formed Steel Framing - Prescriptive Method for One and Two Family Dwellings, 2001 Edition." A document with the Errata is available as a free download http://www.steel.org/ construcion/framing/index.html). Questions may be directed to Jay Larson, Director, Construction Standards Development, American Iron and Steel Institute at jlarson@steel.org. ❒

Successful 17th Specialty Conference

The Wei-Wen Yu Center for Cold-Formed Steel Structures (CCFSS) sponsored the 17th International Specialty Conference on Cold-Formed Steel Structures in Orlando, Florida on November 4-5. Approximately 100 attendees representing over a dozen countries participated in the conference, presenting over 40 papers and research findings. Subdivided into (9) sessions over two days, one session dealt specifically with Wall Studs, while other sessions related to the framing industry included Building Systems, Materials, Elements, Flexural Members and Beams, Compression Members, and Connections. One presentation included information on single slip track design, reported as part of the April, 2004 Technical Exchange in the LGSEA Newsletter. Also, Reynaud Serrette presented information on the LGSEA testing of deep-leg L headers (see article, next issue.) The 817-page conference proceedings manual, as well as proceedings from previous specialty conferences, are available from the CCFSS at cstratman@UMR.edu ❒

News Briefs

Cold-Formed Steel Design Standards Available

Just recently AISI announced a reduced pricing structure for their 2004 editions of the Standards for Cold-Formed Steel Framing. Two new standards join the existing set of ANSI-approved publications. The new pricing structure is available to LGSEA members through the LGSEA website.

The standards provide the latest technology for designing, specifying, and constructing steel framed residential and light commercial buildings. The standards were developed by the AISI Committee on Framing Standards (COFS), an ANSI-accredited, consensus standards body that develops, maintains, and improves design and installation standards using cold-formed steel framing. The new documents are the Lateral Design Standard and Wall Stud Design Standard.

The Lateral Design Standard contains requirements for shear wall design, diagonal strap bracing, and diaphragms. Like the IBC and NFPA model building codes, this standard has design procedures for Type I (segmented) and Type II (perforated) shear walls. Diaphragm values for wood structural panel sheathing are included as well as a procedure for determining design deflections so the designer may now check code drift limits for seismic.

The Wall Stud Design Standard is for the design and installation of steel studs for both structural and non-structural walls in buildings. Provisions are included for determining the effective length of wall studs in compression, as well as requirements for all-steel design, or sheathing-braced design, including a special load combination for evaluation of the stud without sheathing in the event it has been removed. Provisions for the design of stud-to-track and deflection track connections are included as well.

See the LGSEA web site for other important documents. ❒

LGSEA Energizes Education in Partnering with SEAONC to Present Cold-formed Steel Seminars

The LGSEA continues to hold education a high priority. Beside routine engineering and building official seminars, the LGSEA has partnered with SEAONC to prepare an in-depth cold-formed engineering seminar.

The two part, two day, seminar will be held on April 20 and 27th in the San Francisco Bay Area. Leading engineers and researchers will make the presentations.

Some of the subjects and speakers currently lined up for the event are: ***Introduction to Cold-Formed Steel Framing*** by Nader Elhajj, ***Load Bearing Mid-Rise Design*** by Pat Ford, ***Design & Inspection of Steel Floor Joists*** by Nader Elhajj, ***Steel Truss Design & Construction*** by Dave Dunbar. ***ISSI System*** by Marc Press, and ***Light Gauge Insulated Panel Systems*** by Tony Wu. Other subjects expected to be covered are: ***Overview and Code Development***, ***Bearing Wall Systems***, ***Lateral Systems, Exterior Wall Systems/Cladding***, ***General Detailing and Construction Issues***, and ***OSHPD Detailing***.

Contact the LGSEA for more information and registration. ❒

Deflection Track Design

The slip track testing last reported in the April 2004 newsletter has made further advances. In the interim, the testing has resulted in specific design formulas, with slightly modified load resistance and safety factors. AISI's Committee on Framing Standards has balloted, approved, and incorporated the new equations into section C4.3 of the Wall Stud Standard .

The modified standards along with some typical design examples based on the provisions are the subject of a new LGSEA tech note due out this spring.

METALCON 2004 Successful for LGSEA Committees

The LGSEA held four of their semi-annual committee meetings this past October 20 in Las Vegas, Nevada, in conjunction with METALCON International, the #1 trade show for the metal construction industry. Over 7,000 attended the show. LGSEA also took the opportunity to celebrate its 10-year anniversary and recognize some of its key members and founders (see related article, page 6).

The following committees met: ***The Truss Committee,*** moving forward under the new leadership of ***Brad Cameron*** of Keymark who was appointed in 2004. ***The Fastener/Connector Committee*** welcomed new committee chair ***Greg Greenlee*** of USP. Two technotes soon to be finalized out of this committee are the "Clip Angles Used in Cold-formed Steel Construction" and "Slip Track Design". ***The Structural Assemblies Committee***, chaired by ***Jeff Ellis*** of Simpson Strong-Tie continued to work on the "Design of Wood or Steel Sheathed Cold-Formed Steel Framed Shear Walls" and the "Design of X-Brace Lateral Force Resisting Systems" technical notes. Both technotes are based upon the same building design example for ease of comparison. ***The Research Development Committee***, chaired by ***Dean Peyton*** discussed current corrosion studies in progress, Cyclic SW Testing with Fiber Board, Upcoming Deep Leg to Track L-Header Testing, and had a presentation of recent testing results for exterior curtain wall clip angles in tension.

For Committee meeting minutes as well as additional information on upcoming meetings, go to www.LGSEA.com. For information about the upcoming METALCON 2005 show in Chicago, go to www.METALCON.com.❒

Product Exchange Section

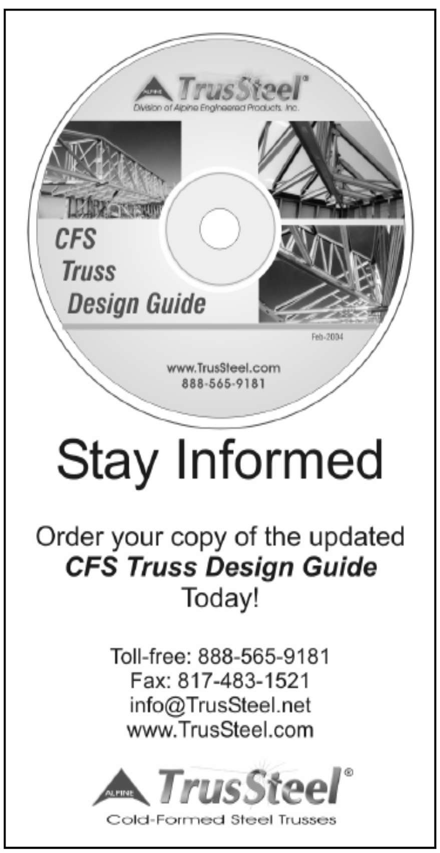
Statements and opinions contained in this "Product Exchange" section are produce and prepared by Sponsor Members of the LGSEA. This section is intended to provide a forum for the exchange of relevant product information in the industry and the information is made available with the express understanding that the publisher does not render technical services. All technical matters should be evaluated by a qualified engineer before being relied on for any particular situation. Contact the product manufacturer for all questions.

Specifying Hardened Pin Fasteners for Fiber Cement Siding Installations

By David P. Nolan, P.E. – ET&F Fastening Systems, Inc.

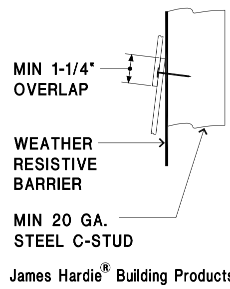
Strong. Non-combustible. Durable. Termite resistant. These qualities, commonly associated with steel framing, are also used to describe fiber cement exterior siding. Both building materials are gaining market share in the residential and light commercial markets.

However, ingredients like Portland cement and ground sand can make it difficult to attach fiber cement siding to steel framing. These abrasive materials dull screw points, slowing down the screw's ability to pierce steel. Pneumatically driven, hardened steel pins with ballistic points are not adversely affected when driven through fiber cement and will improve speed of installation over screw fastening. Code recognized design values are available to aid engineers in specifying pneumatic pin fasteners for attaching siding installation to light gauge steel framed buildings.

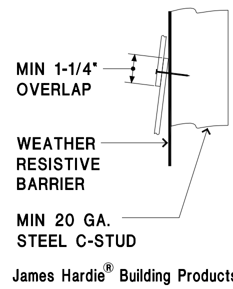


Specifying the correct pneumatic fastener largely depends on the method by which the siding is to be installed. For lap siding, blind nailing usually is the most desirable method of installation. As shown in Figure 1, blind nailing covers the fastener head and provides the most aesthetically pleasing appearance. For this method of installation, a fastener with a large head is required to provide maximum clamping force to secure the plank only at the top edge.

Blind Nailing
Fig. 1



Face Nailing
Fig. 2



For panel siding, areas with high wind loads, or when installing wide plank products, face nailing may be required to achieve sufficient strength. As shown in Figure 2, this method attaches the plank at both the top and bottom edges, providing higher wind resistance. When face nailing, use a fastener with a smaller head diameter to improve aesthetics.

The wind resistance of the siding assembly is a function of the siding type and plank width, stud spacing, exposure category, building height and fastener type. ET&F Fastening Systems, Inc., the leading manufacturer of pneumatic tools and hardened steel pins, and James Hardie Building Products, Inc., the leading manufacturer of fiber cement siding, have combined to perform extensive lab testing of their products with light gauge steel framing. The results are published in ICC Evaluation Service Legacy Report NER-405.

Tables in the NER report provide design values to attach James Hardie brand siding with ET&F brand pins to minimum 20 ga steel. Values for both blind nailing and face nailing are available. This report provides design parameters to resist maximum basic wind speeds up to 150 mph. For most combinations of siding thickness and stud spacing, pins will provide wind load resistance values approximately equal to code recognized values for screws in up to 16 ga studs.

A copy of the complete NER-405 report is available on line at www.jameshardie.com and www.etf-fastening.com. For more information about pneumatic pins, please contact Dave Nolan at (800) 248-2376. ❒

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Connector Assemblies Aid Designers

By Lance Schloot, The Steel Network, Inc.

The Steel Network empowers light gauge engineers to enhance their value to installers, EOR's, and owners by developing innovative improvements for load bearing wall framing such as ***SigmaStud™, StiffWall®, and BuckleBridge™***.

SigmaStud's unique shape significantly increases load capacity as much as 40% when compared with "C" section studs, providing options for design for structures up to nine stories in height. Because of ***SigmaStud's*** proprietary advantages, there are similar positive effects on labor costs because thinner materials allow for easier handling and faster connections. Here the differences are particularly sizeable providing the opportunity of choosing a 43mil (18ga) ***SigmaStud*** as opposed to a 97mil (12ga) "C" stud. In a 10' wall height, the difference is nearly 13 pounds of steel per stud.

Engineered to meet AISI wall bridging stiffness requirements, ***BuckleBridge*** delivers unparalleled strength through its lightweight, one-piece assembly, continuing a TSN tradition of constantly seeking new ways to improve wall bridging methods. ***BuckleBridge's*** individual pieces lock (or snap) together through the stud knockout to provide a continuous row of solid bridging in addition to a simple layout for stud spacing. Tabs containing pre-drilled holes permit the fast and accurate connection to each adjacent stud.

Finally, ***StiffWall SW-S*** is a completely engineered component shear wall system resulting in an easily definable load path and delivering the construction community a simple solution with considerable value and cost control. ***StiffWall SW-S*** consists of a column, strap track, boot, and flat strap. The stiffened-flange column resists higher loads than conventional (S)-section studs thus effectively eliminating the use of built-up columns of 2 or more members. The boot provides a simple and efficient connection point between the end column and the structure, transferring both compression and shear forces. On top of this, both the strap and track deliver a defined fastener pattern for the tension members, resulting in fewer screw fasteners.

Through the use of TSN's load bearing wall systems, owners can realize material cost advantages, engineers have more options in the design and quality of their structures, and contractors can erect the same wall with less labor and time than typical "C-section" walls.

It is the engineers who deliver these labor and cost solutions who are able to provide greater value to their clients. ❒

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New Sure-Span™ Floor Joist System Developed for the Light Framed Steel Industry

By Georgi Hall, and Hoang Nguyen, CEMCO Research and Development Division

The cold-formed steel construction industry has evolved and grown rapidly in the last several years. This evolutionary growth can be attributed to the combined efforts of organizations like LGSEA and substantial investments by manufacturers like CEMCO. Following detailed consultation with the design and construction community, finite element modeling and analysis, component testing and full-scale testing, CEMCO recently released a new cold-formed steel floor system—Sure-Span™—for the light frame construction market. Using the new floor system (joists, rim tracks, clip angles and stiffeners), builders have already realized that more efficient construction can be achieved without compromise of structural integrity.

The Sure-Span™ floor joist system was developed for both commercial and residential building construction. The joists have pre-punched trapezoidal flared web holes (punch-outs) that enable sub-trades to take advantage of access routes for various services such as plumbing, HVAC, technology, and electrical. The system also includes a rim-track with web stiffening clip angles located to facilitate the installation of the floor joists. In addition to providing strength and stiffness, there are many other serviceability and constructability advantages Sure-Span™ lends over traditional steel floor joist systems. For example, engineers have greater flexibility in the final lay-out of the floor rim track because Sure-Span™ rim tracks can accommodate deep clip angles that also serve to reinforce the web without the need for additional stiffeners.

Trapezoidal Embosses

Rim Track Clip Angle

Joist Span Table : 6" Min. Hole Offset from Bearing Support

Joist Designation	15 psf Dead Load and 40 psf Live Load							
	TL Deflection = L/240, LL Deflection = L/360				TL Deflection = L/240, LL Deflection = L/480			
	Single Span				Single Span			
	Spacing (in) o.c.				Spacing (in) o.c.			
	12	16	19.2	24	12	16	19.2	24
725SSCJ175-43	15' - 4"	13' - 4"	12 - 2"	10' - 10"	14' - 10"	13' - 4"	12' - 2"	10' - 10"
725SSCJ175-54	17' - 6"	15' - 11"	15 - 0"	13' - 11"	15' - 11"	14' - 5"	13' - 7"	12' - 7"
725SSCJ175-68	18' - 10"	17' - 1"	16 - 1"	14' - 11"	17' - 1"	15' - 6"	14' - 7"	13' - 7"

Sure-Span™ is available in a variety of sizes and thicknesses. Identification of the joist and rim track sections is also consistent with current standards. For example, a 12-in. 54 mil joist with a 2-in. flange is identified as 200SSCJ200-54 where SSCJ refers to a Sure-Span™ Cee Joist (a similar designation applies to rim track (RT), i.e. 1200SSRT150-54). Span tables, strength properties, and details for the Sure-Span™ floor system (similar format to the SSMA catalog) are available at CEMCO's website (www. cemcosteel.com). Technical support for Sure-Span™ is available through CEMCO Engineering Department (1-925-473-9340) or Sure-span@cemcosteel. com.

The Sure-Span™ floor system is the result of CEMCO's commitment to innovation, quality, construction efficiency and continuous improvement in the manufacture and delivery of building products for the framing industry. ❐

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