Newsletter for the **February 1998**

Light Gauge Steel Engineers Association

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Upcoming Events

Homebuilding & Remodeling Show — February 5-8
Honolulu, HI
Info: (808) 847-4666

Sustainable Steel — March 18-21
Orlando, FL
Info: (202) 347-8200

AISI Residential Advisory Group — March 17-18
Orlando, FL
Info: (202) 452-7202

LGSEA Meetings — March 21
Orlando, FL
Info: (615) 386-7139

Western Building Show — June 25-27
San Francisco, CA
Info: (916) 325-9300

LGSEA Meetings — June 26-27
San Francisco, CA
Info: (615) 386-7139

Cold-Formed Steel Design Software Aids Efficient Engineering

Although cold-formed steel studs and other light gauge shapes have been used as structural elements for years, only recently have wall stud and floor joist elements been considered as a standard framing material on par with light frame timber construction. As the cold formed steel industry continues to grow, so does the demand on engineers to produce cost-efficient structural designs.

Designing with cold formed steel per the AISI Specification is not an easy task, to say the least. Before the appropriate size stud, joist, or other design element can be selected, the engineer must have calculated section properties for the various available sections as produced by the many different stud fabricators. Typically, the engineer may turn to the specific stud manufacturer to obtain pre-calculated tables for stud section properties for their specific studs. If the engineer chooses to use these pre-calculated tables, it forces the design to fit within the increments of loads and member lengths as found in the tables provided by the manufacturer. The result can be a less cost-effective or more conservative design. The alternative is for the engineer to become more familiar with the code specifications and provide a calculation for a specific design. To calculate the section properties (specifically the "effective" section properties) is very cumbersome. Fortunately, there are now software design programs that are available to the consulting engineer.

Where software programs once were developed and kept in-house by stud manufacturers and specialized engineering firms, these programs have become readily available. Finding a program that meets an individual engineer's specific needs isn't always easy, however, and there are not any software stores where you could quickly find what is

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Merger Talks: Combined Stud Associations Would Produce Steel Stud Manufacturers Association

The merger of the two industry associations which represent the majority of stud manufacturers in North America is in the implementation phase. In April, members of the Metal Lath/Steel Framing Association (ML/SFA) and the Metal Stud Manufacturers Association (MSMA) have tentatively agreed to hold the first organizational meeting of the Steel Stud Manufacturers Association (SSMA). Currently, ML/SFA members are voting to finalize the merger. The groundwork for the new organization was prepared by a steering committee comprised of appointed representatives from the MSMA and ML/SFA which met several times during 1997.

Traditionally, the ML/SFA has represented stud manufacturers in the eastern half of the United States and Europe while MSMA members primarily serve the Western U.S. Markets and Pacific Rim. It is estimated that by combining the existing membership of both organizations, the majority of the cold-formed stud manufacturers in the United States will be represented by a single voice.

Even before this planned merger, the ML/SFA and MSMAhave already jointly developed a designator system which uses a common nomenclature. ❑

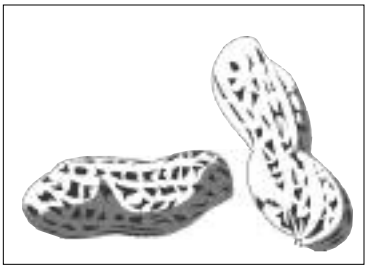
Newsletter for the Light Gauge Steel Engineers Association

Please Pass the Peanuts

(Part 3)

By Don Moody, Western Metal Lath

In Part 1 (*LGSEA Newsletter*, May 1997), I used peanuts and the fact that they sell for more per pound than steel studs to make a point about the commodity nature of the steel stud industry. The existing steel stud markets are fully enabled and, as a consequence, the stud manufacturer is economically relegated to the role of producing and delivering quality products on time and at the lowest possible prices. All other services and functions attendant to the use of steel studs (the infrastructure) are provided by the market. This explains why stud manufacturers can sell studs for "peanuts" in those markets and still survive.



Part 2 (*LGSEA Newsletter,* October 1997) demonstrated that although the commercial construction market for steel studs and the residential market for dimensioned lumber are examples of fully enabled markets with their requisite infrastructure in place, the residential construction market for steel studs is not. I concluded that steel framing will not gain significant market share in residential construction until the necessary infrastructure is in place, and that it will take an industry-wide effort to develop it. Realizing this, the steel stud industry has taken some very significant steps over the last year that should go a long way toward enabling the development of this infrastructure. Those specific steps are the subject of this article.

Standard Metal Stud Designators, Profiles, Thicknesses and Specifications

The first step toward achieving such a standard was taken in April 1996 at a joint meeting of the Metal Stud Manufacturers Association (MSMA) and the Metal Lath and Steel Framing Association (ML/SFA). The memberships of both organizations unanimously agreed to adopt and encourage the widespread acceptance and use of a universal designator system for light gauge steel framing members (*LGSEA Newsletter, October 1996*). The industry's decision to use this system is intended to facilitate the use of light gauge steel framing members in existing markets, and to accelerate their acceptance in new markets. This is the start of building the infrastructure for residential construction.

With the new standard designator system, and the agreed upon profile geometries and minimum thicknesses, the section properties and load carrying abilities of any given profile can be calculated and standardized. By helping eliminate the confusion that currently stems from the widely varying designators, properties and load tables published by manufacturers producing essentially identical shapes, these standards also will greatly facilitate submittals for plan check, establishment of nationwide code approvals, and development of software and other tools for engineering and estimating. These are all elements of an enabling infrastructure for residential construction and all of them are more easily and quickly developed by having industry standards to build upon.

This approach has precedence in the construction industry. The production of I-Beams, structural channels, angles, etc. is standardized, in terms of dimensions and structural data. Those standards are published by the America Institute of Steel Construction (AISC) in a single manual. As a result, every designer, engineer, and plan checker knows exactly where to find the information they need relative to structural steel products and every building code has adopted AISC's specifications. Dimensioned lumber, with its 2x format is another notable example.

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"Sustainable Steel" Conference Attracts Leading Specialists in Green Building Design.

The first international symposium on sustainable steel framing construction, featuring 60 presenters from a dozen countries will be held March 18-21 in Orlando, Florida. More than 300 attendees are anticipated, many from more than a dozen other nations where steel framing has gained a foothold.

The "Sustainable Steel" conference is intended to provide the first global forum for the exchange of information and ideas on the use of steel in today's energy efficient, environmentally responsible structures. Already, delegations from Europe, Asia, Australia, and the Americas have committed to attend.

Twenty in-depth sessions will help develop the primary conference themes: Exploring the Principles of Environmentally Responsible Construction, State-of-the-Art Design and Engineering in Commercial Buildings, Light Gauge Steel Construction Solutions, and The Future of Green Buildings in Steel. Several projects will be featured in the conference, including the athletic and housing facilities for the Sydney 2000 Olympics by James Grose of Grose Bradley, Australia. Chris Smith of London-based Ove Arup & Partners, a member of the design team responsible for the Commerz Bank Tower in Frankfurt, Germany, will review the design considerations for Europe's tallest building. Charles Kibert, Director of the University of Florida's Center for Construction and the Environment, will examine the integration of sustainable design elements into the Summer House at Kanapaha Botanical Gardens. The conference program also includes a special session on engineering design software, featuring demonstrations of most of the industry's leading programs.

The main sessions will take place at the Hyatt Orlando Hotel in Kissimmee, Florida. For more information about this program, call (202) 347-8200 or e-mail: ssteelconf@aol.com. ❑

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LGSEA Committees Set 1998 Objectives

At the January meetings of the active LGSEA committees, each set a series of objectives for the coming year. Their progress will be chronicled in the *LGSEA Newsletter* and LGSEA members are encouraged to actively participate in these programs.

Truss Committee

- Establish an official relationship with the AISI Committee on Steel Framing Standards;
- Update the Truss Design Guide;
- Develop a workshop on Truss Design
- Complete reviews and publish a Technical Note on Permanent Bracing of cold-formed steel trusses;
- Complete development of, and publish Truss Field Installation Guide;
- Complete reviews and publish a Technical Note on Specifying Pre-Engineered Trusses;
- Complete reviews and publish Truss Inspection Checklist/Field Guide;
- Establish an In-Plant Quality Control program.

Fastener/Connector Committee

- Complete Tech Notes on Clinching, Pneumatic Pins, Design of Self-Drilling Screw Connections, and Welding;
- Develop Tech Notes on Wall Anchorage, Screws - Exterior Sheathing, Curtain Wall Design, and Fastener Corrosion;
- Explore / document areas of potential cost reduction, including new methods of connections (i.e., adhesives), and initiate a comparative study of construction costs for a house designed with different screw sizes.

Education Committee

- Deliver to targeted cities around the United States a 6-hour seminar on cold-formed steel framing design, which was developed by the American Iron & Steel Institute (AISI);
- Develop a complementary session on the practical aspects of cold-formed steel design;
- Create a standardized 90-minute presentation structured for engineers, architects, and building officials.

Lateral Load Design Committee

- Work with AISI to develop tabulated diaphragm design values for light gauge (cold-formed) steel construction;
- Support a move to adopt the aspect ratio calculations for wood shear walls;
- Develop a Tech Note on shear walls and diaphragms with openings;
- Develop a Tech Note on Transfer of Load;
- Provide answers to questions on the use of pins in high seismic zones;
- Testing program to determine design values for walls with Plywood/OSB on two sides;
- Put closure to the issue of strap over strength in X-braced walls. ❑

TECHNICAL EXCHANGE SECTION

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 Dean Peyton at 253/941-9939). Upon editorial review your submission may be printed in the Technical Exchange Section of this Newsletter

Using thePrescriptive Method and CABO Code

by Don Allen, BLB Consulting

Until recently, engineers and builders working on a steel framing project were at a distinct disadvantage against those building with wood. Unlike wood, the building codes contained no prescriptive guidelines that could be used to design steel framed structures. Consequently, the process of designing a home was usually more expensive and took longer than with wood.

In the last year, the playing field started to get a lot more level. There are more engineering firms knowledgeable in the design of light steel framing. And while it's not always necessary to incur engineering fees for simple structures, engineering costs for steel have been coming down in some parts of the country. Perhaps the most significant factor was the development of a Prescriptive Method and adoption of prescriptive requirements for cold-formed steel framing by the Council of American Building Officials (CABO) into the "One and Two-Family Dwelling Code."

In effect, the Prescriptive Method allows architects, framers, builders, and even homeowners to do their own wall stud and floor joist design. This is also a major help to the structural engineer who is new to cold-formed steel because there is now a common reference that can be used to design simple structures. Seasoned light gauge steel engineers also benefit because it helps speed rudimentary engineering, and allows more time for design review and to develop design solutions for many of the structural conditions not covered under the Prescriptive Method.

No matter where you are in this process, it helps to know what is in the code and how to use it. In this article, a quick step-by-step procedure for designing steel framed wall studs will be presented. Similar procedures can be used for floor joist design, header design, bracing design, and rafter design.

Step 1: Know the local requirements.

If you are a first time steel builder, or designing in a new territory, make sure to check with all building agencies that may have jurisdiction. Find out exactly what drawings or sketches they need, what building code they use, and what loads they require for design. Most experienced engineers already know how important it is to take this first step, and they do it as a matter of course.

Also, find out who will actually be inspecting your framing. If the inspector is not familiar with cold-formed steel, it may be in your best interest to help them. Making the building inspector's job easier can save you both time and money once your project is underway.

Step 2: Know the Loads and Codes

Hopefully, your county or city has adopted the '96/'97 Revisions to the 1995 CABO One and Two Family Dwelling Code which is accepted in most areas of the country. Based on national standards, the local municipality has probably adopted the following for your city or county:

- wind speed;
- wind exposure category;
- seismic zone;
- ground snow load.

For example, in the Atlanta area where I live, the wind speed is 80 mph, the exposure category B or C, the seismic zone is 1, and the ground snow load is 5 psf. You need some or all of these values to go through the tables in steps 4 and 5. Section 301 of the CABO code has some charts and tables to give you a good idea of what these loads are. However, if you're a builder and you want to make sure everything is correct, ask an engineer or building inspector.

Step 3: Design Within the Code Limits

The Prescriptive Method for Residential Cold-Formed Steel Framing (AISI publication #RG-9713A - second edition) illustrates applicability limits in table 1.1 on page 2. If you are using the CABO code, this is summarized in section 603.1.1: Applicability Limits for Steel Wall Framing. Basically the structure must be less than 60'long, less than 36' wide, and a maximum of 2 stories. The

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CABO Code

from previous page

maximum design wind speed is 90 mph - exposure C, or 100 mph - exposure B; the maximum ground snow load is 50 psf; and the allowable seismic zones are 0,1, and 2.

If the structure you are building exceeds any of these conditions, you should consult with a licensed professional engineer for design help.

Step 4: Design from the Top Down - Second Floor Walls

Table 603.3.2a (right) in the CABO code covers either second floor wall studs, or first floor studs on a one story building. Basically, the studs support only a roof and ceiling, and not the weight of floor joists or other floor loads. If you compare the values in this table with those in table 603.3.2b, you will see that a first floor stud must be thicker or shorter to carry the same wind load as a second floor stud.

For example, say you are designing an 8'wall with studs at 24" on center. Your building inspector has told you that you are in a 70 mph wind zone, exposure B, and you want to use 2 x 4 steel studs (3-1/2" x 1-5/8"). From the table, it says you can use a stud thickness of 33 mils (20 gauge). Notice if you had entered table 603.3.2b with these same values, a 43 mil (18 gauge) stud would be required. If you are using the Prescriptive Method, you will get the same values using table 6.2 with a ground snow load of 50 psf.

Table 603.3.2a: COLD FORMED STEEL STUD THICKNESS
Studs Supporting Roof and Ceiling Only
(One-story building or second floor of a two-story building)

Wind Exposure		Nominal Member Size	Member Spacing (inches)	Stud Thickness (mils)[1,2]											
				8-foot Walls Building Width[3] (ft)				9-foot Walls Building Width[3] (ft)				10-foot Walls Building Width[3] (ft)			
Exp B	Exp C			24	28	32	36	24	28	32	36	24	28	32	36
70 mph		2 x 4	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
		2x 6	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
80 mph	70 mph	2 x 4	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	43	43	43	43	43	43
		2 x 6	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
90 mph	80 mph	2 x 4	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	43	43	43	43	43	43	54	54	54	54
		2 x 6	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	33	33
100 mph	90 mph	2 x 4	16	33	33	33	33	33	33	33	33	43	43	43	43
			24	43	43	43	43	54	54	54	54	68	68	68	68
		2 x 6	16	33	33	33	33	33	33	33	33	33	33	33	33
			24	33	33	33	33	33	33	33	33	33	33	43	43

For SI: 1 inch = 25.4 mm, 1 mil = 1/1000 inch = 0.0254 mm, 1 foot = 304.5 mm, 1 mph = 1.609 km/hr, 1 psf = 0.0479 kN/m^2

1 Deflection load assumptions: L/240

2 Design load assumptions: Roof dead load is 1 psf. Ground snow load is 50 psf. Attic live load is 10 psf.

3 Building width is in the direction of horizontal framing members supported by the wall studs.

Additional Information: 33 mil = 20 gauge, 43 mil = 18 gauge, 54 mil = 16 gauge, 68 mil = 14 gauge.

Step 5: First Floor Walls

First floor walls are the same as second floor walls, except you use a different table in the CABO code: table 603.3.2b. If you are designing a one story building, you may skip this step, and move on to connection and bracing design. If you are using the Prescriptive Method, you may use table 6.3 for 8' walls, table 6.5 for 9'walls, and table 6.7 for 10' walls. Note that using these tables with a 50 psf snow load and a building width of 36', you will get the same results at table 603.3.2b.

Step 6: Connections and Bracing

The basic connection in a wall is screwing the stud to the track, and bolting or nailing the track to the foundation below. There are also special considerations for wind bracing or seismic design. Table 6.14 in the Prescriptive Method provides fastener schedule for walls, and publications like the LGSEA *Technical Notes* provide additional guidance on choosing the right screw for specific uses. ❑

Design Software

from page 1

available and compare features. For designers who don't know where to look in the first place, shopping for cold-formed engineering software is guaranteed to be an exercise in frustration.

The LGSEA began addressing that issue last year when it conducted a survey of members to determine which software programs were most commonly used. (The survey found a number of firms using proprietary in-house software. Since these are not available to outside users, these were not considered for this article.) The following is a list of some design programs where to call for more information about a specific program. In the next issues of the LGSEA Newsletter, we will offer readers a summary of available programs and comparison of their analysis and design features. The LGSEAdoes not endorse specific products and encourages readers to contact these software providers for additional information. The following programs are listed alphabetically. ❑

Program Name	**Author/Company**	**Phone Number**
AISIWIN (Ver. 2.0)	Madsen/DEVCO	(541) 757-8991
CFS	Glauz/RSG Software	(816) 524-5596
COLDSTEEL	Glancy/Energy Corp.	(602) 345-1754
C-Stud Analyzer II	Mucha/Metal Stud Syst.	(800) 683-3235
IT/ Keymark	Dietzen/Keymark	(303) 443-8033
PROP86	Kulpa/Sure-Tie, Inc.	(714) 832-4503
STRAP	Diamont & Maon/ATIR	(800) 644-6441
TRUSS D & E	Butts/JFB & Assoc.	(719) 598-7666

Peanuts, part 3

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A Unified Industry

It is estimated that the combined memberships of the MSMAand ML/SFA represent about 70 percent of the total domestic steel stud market. Using the new designators, design thicknesses, and profile geometries, MSMA and ML/SFA will each publish new catalogs which, over time, will replace the individual manufacturer's catalog of structural data. MSMA's membership standardized their products several years ago and currently publishes a catalog reflecting those standards. An updated catalog will reflect the new system of designators and standards. ML/SFA will publish its first standard catalog, which will also use the new systems. With some minor variances for regional differences, these two catalogs will contain essentially identical information and will each be prepared using the same software. At some point in the future, one catalog could be published for the combined membership of the MSMA and ML/SFA.

Having two trade associations representing the stud industry, each using the same designators and standards, and prepared with the same software has also led to discussions about the possibility of joining the two groups into one (see "Possible Stud Merger Would Create SSMA", page 1). Such a merger would produce a number of benefits including:

• A single organization would enable the stud industry to speak with one voice in dealing with standards writing groups, building codes, and other organizations whose actions have an impact on the use and application of steel studs;

• Intra-industry differences would be resolved at the association level, resulting in less confusion in the market, fewer regional differences, and a general enhancement of the industry's effectiveness in serving its existing markets and in developing new markets;

• Research and development efforts would be prioritized and funded by the combined resources of both groups. In addition to eliminating duplication of research efforts, this would permit a larger scale of research to be undertaken and

er scale of research to be undertaken a would ensure that changes resulting fro new research would be universal accepted. Ultimately, this would result newer and better technical informati for the industry;

• The industry would benefit from broader perspective that would enable to rapidly and effectively identify a address the evolving needs of its cu tomers;

• A single association representing abo 70 percent of the total market mig attract additional manufacturers wl presently do not belong to either existi association.

Acceptance of New Designators a Standards

It is a monumental achievement that t memberships of MSMA and ML/SF have agreed to the uniform designato and standards. Since that time, the desi nators have been incorporated into t newest draft of the *Prescriptive Meth for Residential Cold-Formed Ste Framing*, which was prepared by t National Association of Home Builde (NAHB) Research Center for the U. Department of Housing and Urba Development (HUD). This Prescripti Standard will be the basis of submittals include new and more extensive buildi code information in each of the existi model codes and in the upcoming natio al building code.

The light gauge steel framing industry rapidly growing. Light commerci structures previously framed in oth building materials are increasingly bei framed in light gauge steel. Residenti construction represent a new a extremely large opportunity for lig gauge steel; every 10 percent of mark penetration doubles the existing size the stud industry. Meeting the needs these new markets while encouragi and enabling growth in existing marke are what the new standard are the prob ble merger of MSMA and ML/SFA intended to accomplish. They are t necessary first steps. ❑

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❖ NewsBriefs ❖

AISI Establishes Committee on Cold-Formed Steel Framing Standards

The AISI Construction Market Committee recently established the "Committee on Cold-Formed Steel Framing Standards" to meet the increasing reliance by building codes in North America on industry consensus standards. This new committee will assume the responsibility for development and maintenance of standards appropriate for adoption by the building codes and will concentrate its efforts on the "Prescriptive Method for Cold-Formed Steel Framing" and the recently adopted cold-formed steel framing submittals in the CABO One and Two Family Dwelling Code. The new committee will be a balanced consensus body, and is intended to provide discipline, diversity, and balance in the critical area of prescriptive standards.

Although the roster of members has been developed, applications will be continually reviewed for potential openings in the future. There is a $100 fee. For more information, contact Kevin Bielet at the AISI at (202) 452-7215 or e-mail: KBielat@steel.org.

New Residential Organization

The Executive Committee of the American Iron & Steel Institute (AISI) has approved the creation of a highly focused new organization that will be charged with quadrupling steel-framed housing starts by the year 2002. The new organization is being called the Residential Steel Partnership and will be affiliated with the AISI.

With the huge potential for growth in steel framed housing, the AISI Executive Committee concluded that the time is now right to expand the steel industry's commitment to this market and restructure the way it does business in order to achieve its aggressive objectives.

The new organization will have an initial budget of $2.3 million, but its officers will be assigned to substantially increase that figure by gaining additional support from allied organizations and industries. The transition and launch of the new organization will be overseen by an interim Board of Directors, and a search is now underway from top officers. The target for full operations is the first quarter of 1998.

METALCON '97 *Sets Record*

METALCON '97, the only annual conference and exhibition of metal in design and construction, set records on every front last year. Attendance reached 7,600, 7 percent more than the previous high. The exposition also showcased products and technology in 560 booths, filling all 120,000 gross square feet of available space in Hall H of the Georgia World Congress Center in Atlanta.

This success of the '97 show has created tremendous momentum for 1998 where 98 percent of exhibit space is already booked. Scheduled for October 20-22, 1998 at the San Diego Convention Center, the '98 show will be the first time METALCON will be held on the West Coast. ❑

Commercial Messages

For infomation about placing Commercial Messages in this newsletter, please contact Larry Williams at (615) 386-7139.

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