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CFSEI: Educating North American Practitioners in Principles of CFS Framing Design

W. D. Allen¹

Abstract

Educating North American structural engineers in the principles of cold-formed steel (CFS) design in general, and about CFS framing in particular, has a unique set of challenges. The undergraduate curricula virtually ignore the subjects, and only a handful of graduate programs address the issue. Several industry associations have existed for engineers, but none specialize in CFS framing. Several organizations existed in the cold-formed steel framing marketplace, but none were set up to accommodate engineers. This paper will review the formation, development, growth, and maturation of one such education- and engineer-focused organization within the framework of the USA design and construction marketplace, and discuss the practicality and potential for this as a use of industry resources for market growth and development.

Introduction

In 1994, representatives from the steel company USS-Posco set up a meeting with key steel framing industry stakeholders in California, USA. They knew they had an excellent product in cold-formed steel (CFS) framing, and saw a huge need for housing and other steel-framed structures in the growing cities and communities across North America. However, they had run into several barriers for acceptance of their products. At this meeting and other gatherings, they had chipped away at each of these barriers with potential solutions. They had developed strategies for educating carpenters, converting wood framers, setting up product distribution, and development of cost-effective tools and systems. But they did not have a solution for the design professionals and building officials: how to educate them on the proper design and inspection of CFS framing. One of several ideas put forth that day was an association

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especially for engineers: a way to produce design resources for the most common CFS design challenges, and a way to develop educational programs and presentations to go along with those resources. The firm handling advertising and public relations for USS-Posco drew up a plan for underwriting and financing such an organization, and within a few weeks, the Light Gauge Steel Engineers Association (LGSEA) was born.

In several ways, the LGSEA has fulfilled its mission to provide education and training to North American designers. However, along the way there were some difficulties and missteps, and lessons learned. The new organization that has emerged from a refocus of the LGSEA is now the CFSEI: the Cold-Formed Steel Engineers Institute. This paper supports the argument that specialty associations for educating and enabling practicing structural engineers CAN succeed, given the proper guidance, personnel, and resources. The LGSEA / CFSEI will be presented as a model for such an association, with examples given of successes and failures in meeting their mission. The conclusion presents the vision for the future of CFSEI, and how the current framework and association is meeting that vision in a down construction market and difficult financial times.

Funding

Whenever a group is formed or technical resources are developed, the cost of developing these resources is always an issue. The initial capital outlay for getting the LGSEA started was provided by USS-Posco. They paid the individual who was the part-time staff of the organization, helped draw up the initial incorporation papers, and provided cash for the initial operating budget. They even paid the first members to come to meetings, and set up the first seminars. Knowing that a funding model was not sustainable, they worked with the initial members and volunteers to develop a long-term funding strategy. At that time, the vision was for a large association, consisting of thousands of engineers as well as industry partners. The plan was to set up a dues structure that could be self-sustaining: by charging enough dues to members, they could pay for staff, projects and programs. This would be supplemented by the sale of publications and the registration fees for educational programs. Membership would be encouraged by member discounts on publications and programs: a principle that has been successful and is still in place today.

The initial budget projections required a fairly large membership and growth to pay for the programs needed to saturate the engineering community with the educational material they needed. Since membership had to grow over time, dues revenue would have to be supplemented. Also, even with a full,

sustainable membership, it was unrealistic to believe that a full-time paid staff could be hired with the specific technical knowledge needed to develop and produce all of the resources needed. Therefore, a key to the initial and ongoing strategy was to develop a cadre of working volunteers to assist and supplement the paid staff. This will be covered in more detail in the Manpower section of this paper.

Another important initial funding strategy was underwriting by industry partners. Organizations such as manufacturers of CFS framing products and accessories, fasteners, software, and other industry associations were targeted as potential supporters of the LGSEA. On one level, this funding strategy has been successful, but it has simultaneously led to tension and conflict within the industry. The source of the conflict was the competition between industry associations for the same limited dollars. Shortly after the formation of the LGSEA, other groups were either in existence or being formed with goals that included the growing the market for CFS framing. Although not necessarily focused on the education of engineers and design professionals, these groups would go to the same sources – manufacturers within the industry – to obtain funding for projects and programs. These manufacturers who also had limited budgets for industry funding, started to feel that their monies were being spent on programs and staff that were in some cases duplicative and redundant. LGSEA, as well as the other industry associations, were politely asked to work together to develop a funding scheme that would eliminate overlapping efforts. This was one of the main reasons that the LGSEA eventually came under the umbrella of the North American Steel Framing Alliance.

Both in the early days of the LGSEA and in the present strategy of the CFSEI, the organization found other ways to leverage industry support. Representatives of manufacturing organizations served as volunteers within the leadership structure. They provided meeting spaces for chapters, committees, and task groups. They provided venues and materials for educational seminars. Their volunteers helped write and review technical documents. And eventually, a dues structure was set up to allow an annual payment that was commensurate with both the size of the company and the potential benefits received from existence of and participation in the association. The current structure of the CFSEI reflects this evolution.

In the intermediate years, however, there were funding problems. As the initial funding from USS-Posco expired, there was not enough dues revenue to cover costs. The single paid staff member would sometimes go for a two or more months without pay, as dues payments trickled in or if underwriting checks were delayed. Payments for presentations, programs, printing, and other projects

were delayed during slow income periods. And once membership had reached about 500 engineers, the rate of growth declined, so dues revenue was an issue. The Board considered raising dues on members. Reviewing the cost/benefits to practicing engineers, and what other associations were charging, it was difficult to justify fees greater than \$100 per person per year. It was discovered that many individuals would sign up for one year, get the binder and mailed tech notes, and then let their membership lapse. In addition, large firms would have only one individual sign up for membership, and then share the resources amongst all members at that firm.

These funding problems, as well as some other issues with manpower and leadership, led to two fundamental changes within the LGSEA. The first was the alignment of the organization with the Steel Framing Alliance (SFA), and the second was the development of a membership-category based dues structure.

Alignment with SFA was a difficult issue: especially for the engineering leadership that comprised the board of directors at the time. There was a major concern that what had started out as an engineering association led by engineers but funded by commercial interests would become merely a vehicle to promote commercial products to the CFS engineering community. In addition, there was a concern about compromising the technical integrity of published documents. Overriding these concerns was the financial reality that the association could not continue to exist with its current rate of spending and income. As a part of the alignment, safeguards were put in place through the CFSEI Operating Procedures that would ensure leadership of the association by practicing professional engineers. The funding program was set up so that members of CFSEI first had to be members of the Steel Framing Alliance, and they were able to opt-in to CFSEI membership. Dues revenues would go into the SFA account, but from this account the CFSEI budget would be formulated, which allowed for a more stable cash flow over the course of a fiscal year.

Through this SFA membership alignment, the membership category based dues structure was another strategy that helped solve the funding issues of LGSEA and CFSEI. Because most major framing manufacturers were already members of the Steel Stud Manufacturers Association (SSMA), the LGSEA worked out an agreement with SSMA so that membership levels in LGSEA would mirror those within SSMA. SSMA had already developed an assessment structure that forced members with higher sales volume to pay higher fees, while at the same time allowed them greater say in the budgeting process. LGSEA was able to use the existing member category structure at SSMA to set dues levels that aligned with sales volumes. For framing manufacturers that were not SSMA members, they would be asked to pay dues at the highest SSMA member category. This

was not to discourage these manufacturers from participating in the engineers association, but to encourage them to participate in their manufacturers association. Although a similar structure was not available for manufacturers of non-framing products, such as tools, fasteners, and connectors, the SSMA model was used for allowing membership and funding by those manufacturer members. Also, larger companies were permitted more members, which allowed them to receive CFSEI and LGSEA documents at multiple branch locations.

The success of this program eventually led to a program of multiple member discounts at a single firm. As noted above, typically a single member would join CFSEI/LGSEA from a single firm. Under CFSEI, the association began more aggressively marketing the value of the 25% discount on programs and publications, as well as reduced member rates for additional members at the same firm. During this membership campaign, additional members from the same companies increased by over 500% for CFSEI.

During 2008, CFSEI membership peaked at just under 800 members. Membership has been down since then, attributed primarily to the current USA recession and decreased construction across North America. However, although staff has been reduced, CFSEI remains a vibrant and viable organization, and although 2009 – 2011 budgets have been reduced, the association is not in danger of collapse due to financial issues.

Personnel and Manpower

To meet the educational mission of the LGSEA and CFSEI, the founders and stakeholders realized that volunteers would be needed: for both the development and delivery of the technical and educational resources, and for leadership of the association. Because of funding issues, it was clear that no more than one or two paid staff would be able to work full-time for the association, without drastic changes in the funding program. The partnership with the Steel Framing Alliance (SFA) helped, in that some of the SFA staff resources could be used for CFSEI programs. Because the early LGSEA staff had no technical background, it was quickly clear that volunteers and contract labor would be needed to develop many of the documents and programs the association envisioned for educating engineers.

With a limited number of structural designers well versed in CFS framing initially, there was a fairly small pool of talent to draw from with respect to Technical Note authors and seminar presenters. The initial authors were a mix of paid contractors and volunteers, many of whom saw the economic benefits to

their own companies and practices in developing these products for the LGSEA. The volunteer model continues today in CFSEI, since in the current budget little funding is available for contract authorship. The addition of technical staff has helped, since initial review, layout, and graphics/detailing can be completed or reviewed by staff, before and during the volunteer technical review process.

Under the current Operating Procedures, the elected officers and voting members of the board of directors consist entirely of unpaid volunteers. There are term limits, to prevent stagnation in the board membership, and local chapters provide training and development of a younger generation of board members who may eventually choose to graduate to the national board. Two face-to-face meetings are held during the year, with the balance of board and staff meetings being held via conference call. All chapter presidents have a standing invitation to all board meetings and may participate in all debate, although only elected national board members have voting rights. So far, this model has worked well, even though budget cutbacks reduced the number of full-time staff at the beginning of 2010. The existence of the educational programs and materials of LGSEA and CFSEI have allowed more engineers to be better qualified in CFS design, thus creating a larger cadre of potential volunteers from which future authors, presenters, and officers may be selected.

Guidance

With an initial mission of educating engineers and design professionals, the LGSEA found that early strategy was fairly straightforward: find out what structural engineers needed to know to safely and accurately design CFS framing, and then create resources and educational materials to fill those needs. Initially, the single paid staff member of LGSEA managed volunteers and contracted with writers to develop and publish these documents. The primary vehicle for this technology transfer was the Technical Note (figure 1). Each note took a specific design principal or strategy, and developed it through text and design examples. Other products developed at the time included newsletters and live seminars. The newsletters, in addition to information about the association and upcoming programs, had a specific section entitled “Technical Exchange.” The Technical Exchange provided a forum for members and others to submit articles and information about design, that did not merit a full technical note, but was still useful for CFS framing designers. In addition, technical articles on recent research, building codes, and structural news were included, as well as announcements of upcoming technical presentations.

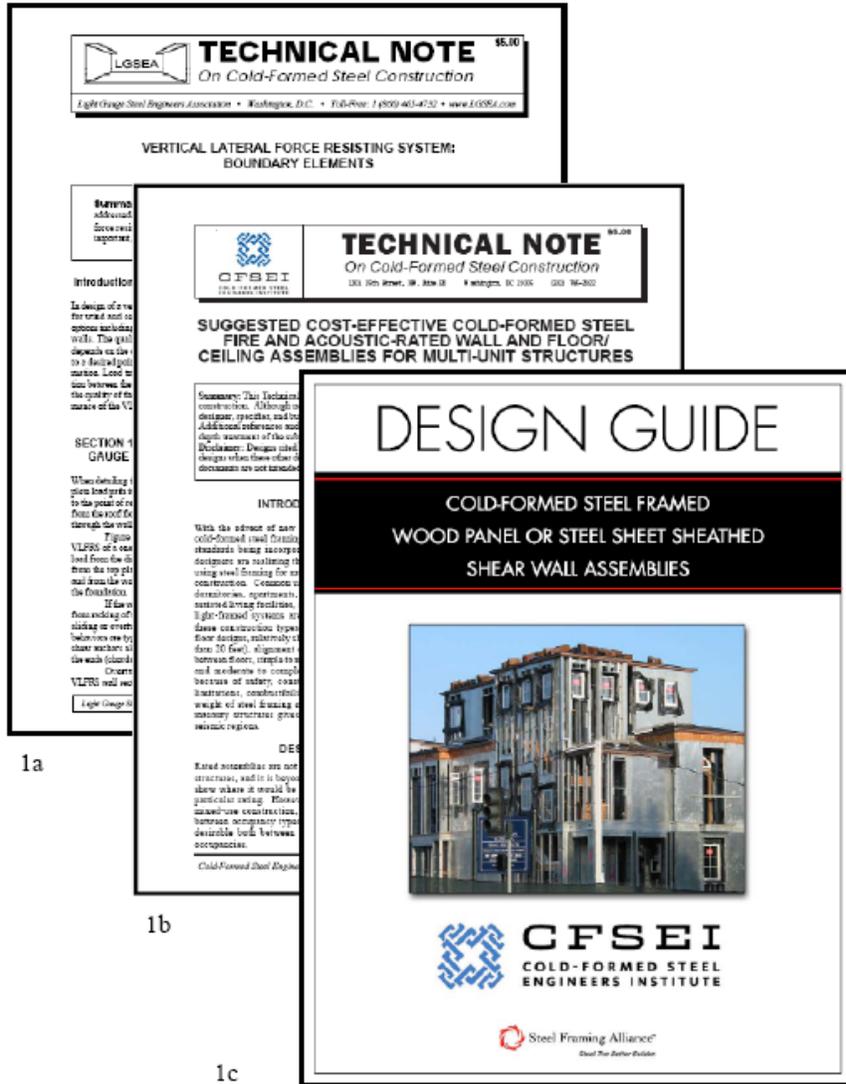


Figure 1: Technical Documents from CFSEI:
1a: LGSEA Technical Note
1b: CFSEI Technical Note
1c: CFSEI Design Guide

This model worked well for the first few years. As more notes were developed, new members were issued a binder with a full compliment of CFSEI print documents and newsletters. Quarterly newsletters were mailed to all members, and Technical Notes that had been developed since the last newsletter were included with the mailing.

The Local Chapter Model

As the membership grew, the leadership saw there was a need for a broader strategy. An association headquartered in California had difficulty developing growth in other areas of the country, and grass-roots efforts were needed to recruit members and attendees at local programs. These local programs were needed to not only provide the education to engineers in a face-to-face setting, but also to develop membership and networking at a local level. thus the chapter model was developed.

Local chapters provided an organization and platform for local events and activities, and were better able to address local engineering priorities such as high-seismic and high-wind issues. The first LGSEA chapter was organized in Hawaii, where termite restrictions had provided a unique opportunity for CFS framing construction. Because of the requirement of pressure-treated lumber, CFS framing enjoyed a moderate cost advantage in Hawaii. There was an urgent need for the training of the local engineering community, and the existing LGSEA structure and technical documents provided a good starting point. The framing community had already formed the Hawaii Pacific Steel Framing Alliance (HPSFA), and several engineers were members. The local structural engineering association also had a strong presence, and most engineers were already familiar with one another's work and practice. Working with active members of the local engineering community, the national staff developed a framework for chapter activities that included local leadership in a board of directors, annual election of officers, a set of chapter by-laws, and a framework for implementing local educational programs tied to the needs of the engineering community. Dr. Reynaud Serrette of Santa Clara University was brought in as the keynote speaker at the first event, where he discussed recent testing of CFS shearwalls. The meeting was well attended, and soon, the LGSEA Hawaii chapter was hosting quarterly events and networking seminars, and became an integral part of the Hawaii engineering community.

Since then, chapters have been established in Atlanta, California, and Florida, and in 2011 the CFSEI Texas Chapter will begin operations. Each chapter has experimented with different types of programs and procedures, but all have

found that addressing local issues and leveraging programs based on national publications and resources works best.

Strategic Planning

In 2006, the LGSEA saw membership growth becoming stagnant. They had successfully partnered with the Steel Framing Alliance, and did not have as much of a concern about funding, but they wanted to ensure the leadership and activities of the association adhered to high moral and ethical engineering and management principals, and that their mission was still appropriate for educating engineers in the 21st century. To meet these ends, the staff and leadership of SFA and LGSEA set up a two-day strategic planning session in Baltimore, Maryland, on the campus of Johns Hopkins University (CFSEI, 2006) Facilitated by Liza Bolles of Newport Partners, LLC, the volunteers not only developed an updated mission and vision for the association, but eight prioritized “key strategies” for implementation of the mission (Figure 2). In addition, to better reflect the new mission and the move of the North American steel industry away from the term “gauge,” the name of the association was debated and changed. For a very brief period, the association’s name was the “Steel Framing Engineers Council,” or SFEC. Upon reflection over dinner and drinks after the second day of planning ended, the name was quickly changed to CFSEI: the Cold-Formed Steel Engineers Institute (CFSEI, 2006)

Under this new framework, local chapters were given more input into national decisions, with assignment of a board-level chapter liaison. An implementation plan was set up for technical document development, and new staff was hired to specifically focus on technical products and programs. In addition, an annual meeting was incorporated into the national organization activities, to provide a “State of the Institute” address to members and stakeholders, and to facilitate networking on a national level. The 2010 CFSEI annual meeting, hosted by the CFSEI Atlanta/Southeast chapter, succeeded in attracting over 100 CFSEI members, guests, and sponsors, and not losing money in the process.

CFSEI Mission

To enable and aid engineers in the efficient structural design of safe and cost effective cold-formed steel (CFS) framed structures.

Vision

CFSEI is recognized as the preeminent worldwide technical resource for cold-formed steel framing design.

Key Strategies

The eight key strategies, in order of highest to lowest priority, identified as most important to the current success of CFSEI are:

1. Produce technical documents that enable and aid engineers
2. Create and promote the CFSEI brand
3. Increase relevance to chapter activities and local membership needs
4. Provide timely and competent response to technical inquiries on CFS
5. Provide forums for exchange of information and ideas related to CFS
6. Partner with aligned organizations
7. Help focus research spending on the needs of engineers
8. Develop awareness of CFS through the formal education system

Figure 2: CFSEI Mission, Vision, and Key Strategies.

Implementation and the Future of the Institute

With the funding, guidance, and personnel in place, the leadership and volunteers must still implement the plan for moving the association forward. To this end, the key strategies help prioritization, and development of technical documents is at the top of the list. In addition to the Technical Notes mentioned throughout this paper, CFSEI is working on more comprehensive documents called Design Guides. The first design guide published under the CFSEI name

was the *Design Guide for Cold-Formed Steel Framed Wood Panel or Steel Sheet Sheathed Shear Wall Assemblies*, by primary author Jeff Ellis of Simpson Strong-Tie, released in 2009. (CFSEI, 2009). This 57-page document included detailed examples of shear wall design in a 2-story structure, and showcased application of the latest code provisions. Data from this document has been used in CFSEI-developed presentations, including the latest to be presented in October 2010. Ellis has developed live versions of this presentation, and has given it at all of the active CFSEI chapter locations.

Another delivery option that had been used initially in 2004 was web-based seminars. These web-seminars, or webinars, enable CFSEI to reach a broader audience, and reduce the costs of speaker travel and room/lodging expenses for both presenters and participants. Feedback from the first two CFSEI webinars in 2010 has been positive. A third webinar is planned for December 2010, with quarterly webinars presented thereafter. Topics mirror those used in chapter presentations, and coincide with release of applicable technical documents.

With all of this information being developed and disseminated as a part of CFSEI programs and publications, it is very important for the technical credibility of the association that all technical material receive a critical technical review by engineers and specialists knowledgeable in the appropriate subject matter. That is why the CFSEI Operating Procedures include a requirement for review by a Technical Review Committee (TRC), composed of industry experts and specialists. Currently chaired by Rob Madsen of Devco Engineering, the committee has a standing membership, which is augmented by technical reviewers and experts on specific topics, which may sometimes be beyond the scope of typical structural engineering practice. For example, with the publication of Technical Note T001-09, *Suggested Cost-Effective Cold-Formed Steel Fire and Acoustic-Rated Wall and Floor/Ceiling Assemblies for Multi-Unit Structures*, acoustical experts were brought in for both the development and review of the document (CFSEI, 2009.)

Conclusions

Based on the findings of this review of the actions and activities of the CFSEI / LGSEA, it is clear that specialty associations for educating and enabling practicing structural engineers can succeed, given the proper guidance, personnel, and resources. Key factors of this success include a strategic plan that considers the existing construction market and allied organizations. It also includes a long-term plan for funding, that incorporates a tiered membership level based dues structure, and underwriting by other industry associations. It must also address both paid staff and volunteer manpower issues, and find

creative ways to leverage both manpower and funds to serve the goals of the association, as well as the needs of the larger engineering community. It must do this in a context of ethical behavior, both in engineering design and business management.

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Cold-Formed Steel Engineers Institute (CFSEI). (2009). Technical Note T001-09, *Suggested Cost-Effective Cold-Formed Steel Fire and Acoustic-Rated Wall and Floor/Ceiling Assemblies for Multi-Unit Structures*.

Appendix: Organizations Referenced

AISI	American Iron and Steel Institute
CFSEI	Cold-Formed Steel Engineers Institute
HPSFA	Hawaii Pacific Steel Framing Alliance
LGSEA	Light Gauge Steel Engineers Association (now the Cold-Formed Steel Engineers Institute)
NASFA*	North American Steel Framing Alliance (now the Steel Framing Alliance)
SFA	Steel Framing Alliance
SFEC	Steel Framing Engineers Council – the name briefly considered for the CFSEI
SSMA	Steel Stud Manufacturers Association

*Abbreviation not used in this document, but organization is referenced.