A FEW WORDS ABOUT STEEL

STEEL MOVES IN TO SENIOR FACILITIES

BY JEFF KLAIMAL

The Steel Framing Alliance’s survey last year about the market potential for steel in the multifamily residential and light-commercial market is vast. And one segment of that market, assisted-living facilities and other housing for seniors, looks especially promising.

The numbers tell the story. In the year 2000, each of the nation’s 50 states had more people under 18 than people 65 and older. In fact, in about half of the states, the ratio was more than two to one. In 2030, 10 states are projected to have more people 65 and older than people under 18: Florida, Delaware, Maine, Montana, New Mexico, North Dakota, Pennsylvania, Vermont, West Virginia and Wyoming.

In six states, more than one in every four residents will be age 65 and older in 2030: Florida, Wyoming, Maine, New Mexico, Montana and North Dakota. As the oldest baby boomers become senior citizens in 2011, the population 65 and older is projected to grow faster than the total population in every state. In fact, 26 states are projected to double their 65-and-older populations between 2000 and 2030.

As further proof the industry is burgeoning, the government is getting behind affordability in senior-living facilities with:

- Medicaid.
- HUD’s Assisted Living Conversion Plan.
- Section 232 of FHA’s mortgage insurance plan.
- State programs that bring assisted living to subsidized housing.
- National Cooperative Bank Development Corporation through the Coming Home Program.
- Federal nursing home relocation effort.

Housing for this group is already taking several shapes. It may be in the form of single-family homes or apartments (of which 23 percent are currently occupied by people 65 and over), shared housing, age-designated facilities, continued care retirement centers, assisted-living facilities, and nursing homes.

Assisted-living facilities alone currently house more than 800,000 people nationwide in 33,000 facilities. The average size of the facilities is 30 beds, with 23 residents. The average age is 80, and 69 percent of residents are female. These people need help with...
approximately 2,25 activities of daily living, and their average stay is two and one-half to three years.

The facilities may be designed as small apartments or individual rooms, and usually include communal areas for dining and socialization, kitchens, outside space, private family areas, administrative offices, nurses stations and medication storage, staff quarters, and storage.

Design elements include energy-efficient heating and cooling, sound barriers, layout flexibility, accessibility and safety. Naturally, these are the elements that lend themselves to building with cold-formed steel.

As we heard at May’s MASFA Conference from keynote speaker Andy Coelho, construction manager for Sunrise Senior Living, cold-formed steel is a good fit for these facilities. (See the July-August 2005 issue of Framework.) Sunrise, which built about 160 of its 384 communities, recognizes steel’s noncombustibility and its compliance with building codes that correspond to the facilities’ occupancy rates.

Indeed, steel offers even more benefits to this segment. With its high strength-to-weight ratio, it provides the possibility for large spans and open spaces in rooms designed for dining and congregating. From a construction side, critical to the facilities’ bottom line, it offers:

Ease of handling and transportation.
- Ease of fabrication and mass production.
- Speed of erection.
- Flexibility in design.
- Insurance discounts.

Cold-formed steel offers even more advantages specific to this segment. It can be used to build ramps, allow larger windows and extra-wide doors and hallways, and support handrails and shower grab bars with proper blocking installed.

To break into the assisted-living market, all a steel framer needs to do is bid on a project. By selling steel’s numerous benefits, both general and specific to these facilities, a framer can open the door to not only increasing his or her business, but also producing an exceptionally high-quality structure for a well-deserving consumer.

Jeff Klaiman is senior project manager and senior associate for Adtek Engineers.
Research

Blast Resistant Structures with Cold-Formed Steel

By Russell Norris with Don Allen

With recent attacks on U.S. embassies in Beirut and Kuwait, coupled with terrorist attacks on U.S. soil, the U.S. Department of State and others have accelerated research on blast-resistant structures. The DOS has sponsored ongoing research for over two decades, and one of its current programs focuses on blast-resistant designs for facilities that may be the target of large, vehicle-borne explosive devices.

The U.S. Army Corps of Engineers, Engineer Research and Development Center, has performed multiple tests to help understand and validate current designs; several of which include cold-formed steel framing. Part of the rationale for this type of construction, as opposed to a thick, heavy, grouted masonry or poured reinforced concrete wall, is the cold-formed steel-framed curtain wall is taken out of the critical path of the construction sequence. In addition, the inherent ductility of steel can be used to absorb impact, just as is done in auto body construction.

One of the concept designs includes 54-mil CFS studs. This technique can be adapted as a retrofit system inboard of non-blast-design traditional-building facades or as a curtain wall cladding for a new or existing concrete or steel wall. The DOS philosophy tends to place greater emphasis on protecting human life than maintaining a high degree of operational capability in its facilities in the aftermath of an attack. As such, the DOS can acceptreasonable damage to its structures provided it protects its occupants during an attack.

The essence of the steel-stud construction approach lies in the reaction of the studs to the blast loads applied in an attack. Conventionally designed blast-resistant structures merely rely on the bending capacity of framing members, including studs and columns.

The DOS steel-stud design concept takes a different approach. Instead of limiting the construction materials to minimal deformation, this system allows substantial bending and permanent deformation of the members to capitalize on their inherent capacity to elongate and absorb energy. Studs are attached web to web (back to back) to limit rotation during the blast event, which results in much greater elongation and thus energy absorption.

It takes a great deal of energy to stretch a steel member; much more than mere bending. The wall system, therefore, acts more like a net than a wall. This is similar to what happens when a tennis ball hits a net: the net deforms, and the ball falls to the ground and does not bounce back very far, even when hit with great force. When a tennis ball is hit against a rigid wall, the ball bounces back with high velocity. The challenge with this approach is to design and construct the attachment of stud pairs to structure and building frame to accommodate the transferred blast loads and compensate for stud deformations.

Initially developed as a blast retrofit solution, a stud wall partition was installed between successive floors of a structure. This required rigid anchoring of the ends of the studs to keep them from popping out of the track and blowing back into the building. Much like the “glass fails first” criteria employed in blast-resistant glazing design, good design practice for this system also calls for the stud to fail before its connection to structure. The DOS developed a connection using ½-inch steel angle, six through bolts attaching the studs to angle clips and two high-strength undercut concrete anchors connecting the angle clips to structure (See Figure 1).

This construction system was eventually adapted for new construction and multi-story applications, which require a different design approach. Here the tension forces in the wall between floors induced by the load cancel themselves out and the stud pairs are effectively “pinned” at each floor.

The DOS testing program has found that if the steel studs that comprise the exterior framework are run from the first level floor level continuously beyond the roof, they only need to be rigidly attached at the first level floor slab. Attachments at successive floors are permitted to move under normal loading conditions, but the rapid onset of blast pressures and deformation of the studs at these support points causes these floor supports to behave as if they were rigid.

In addition to blast resistance for the entire building envelope, the DOS also mandates forced-entry and ballistic-resistance protection to the lower-

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To receive a copy of the Steel Stud Wall Analysis Code design tool once it is completed, e-mail NorrisRJ@State.gov.
floor areas.

**CLADDING SYSTEMS**

Typical of DOS buildings are exterior claddings comprised of stone, masonry, stucco or other finishes. This cladding affords a measure of physical protection that varies in relation to its density and thickness. DOS has tested various building cladding materials for small-arms fire. The result of this testing is that, generally speaking, if the cladding material features a nominal 4-inch thickness of stone, brick, masonry or concrete, the material will meet the DOS requirement for ballistic resistance on the lower-floor area. Thinner sections of these materials, or stucco systems/EIFS of any thickness, will not provide the required ballistic resistance and need additional wall mass to compensate.

The next element of the security envelope incorporated into the lower floors of DOS buildings is a layer of steel plate that is behind the building’s veneer and attached to the outer flanges of the steel framing. For DOS requirements, the steel plate required behind 4-inch-thick stone needs to be 1/4-inch thick. Thinner sections of stone or brick, or stucco systems/EIFS require the steel plate to be 1/2-inch thick. In either case, the steel plate is attached to the steel-stud framework by welding or screwing. For upper-floor locations, the 54-mil studs are sheathed on the exterior with 54-mil sheet steel to distribute load and block debris generated by the blast.

Recent testing has confirmed that blast-rated curtain wall systems do not require special attachment at the ground floor depicted in Figure 1. Using a “brick ledge” ground-floor detail, shown in Figure 2, the stud framing will behave like an anchored stud due to the rapid onset of loading, the deformation of the stud, and the friction and bearing of the studs against this concrete ledge.

Rough openings are addressed differently depending on whether they occur on portions of the building sheathed in structural steel plate or 54-mil sheet steel. In each case, the blast load is transmitted through the framing to the adjacent structure. For first-level construction, the steel plate is a bit more forgiving, since it takes some of the load that would otherwise be handled by the CFS framing members.

Figure 3 illustrates a typical test configuration of window and sub-frame installed in a test wall system. It allows for mechanical or welded attachment between the window and surrounding steel wall sheathing. A significant advantage of this approach is that it takes these transitional sub-frames out of the construction critical path of the building’s exterior walls. They can be installed anytime after wall stud framing is complete. With the anchorage required to poured concrete or grouted masonry, the windows must be installed earlier in the process for this type of construction. Therefore, if these specially manufactured and relatively expensive blast-resistant windows are late to the job-site, it can delay a concrete or grout pour and delay the entire project.

Another benefit of this approach is that it allows removal, replacement or repair of the window without disturbing adjacent interior finishes.

Ideally this system would be executed employing continuous steel studs from the first level slab to the top of the parapet if the overall building height permits this approach. While steel studs are com-
mmercially available in the United States in 60-foot mill lengths, they might not be available in others. The DOS and ERDC have developed a stud splice detail utilizing 1/2-inch steel plate, approximately 16 inches long and featuring 12 bolts to make the splice. This design is intended to allow the spliced stud to produce its maximum strength and achieve tension membrane over its entire length. The optimum location for these splices would be directly in front of a floor slab. This location is the least likely to interfere with the deformation experienced by the stud pairs under blast loading.

Recent experimentation indicates that if the 54-mil steel sheet is butted to an adjacent sheet they will separate under the blast loading. The deformation and elongation in the studs may create gaps between successive sheets of this steel and allow debris to enter the structure. It is recommended that successive sheets be overlapped 1 inch to 2 inches to reduce this hazard.

Interior sheathing is an important part of this construction system. The large movements experienced during a blast usually detach gypsum wallboard from the interior face of studs at relatively low velocity. Developmental testing suggests that steel-backed gypsum board not only reduces this detachment, but also improves blast performance by preventing movement of the stud pairs.

DOS R&D continues to evolve this construction technique. Blast testing as recent as August 2005 has been performed on full-scale systems, with representatives present from the Steel Framing Alliance, DOS, and the Corps of Engineers. The goal of this and future tests is to move from the prescriptive solution tailored for specific DOS projects to design methodology that is adaptable to other civilian and government projects, with the ultimate goal of using steel to save lives. To this end, the DOS in conjunction with ERDC and the University of Missouri are developing a PC-based design tool called the Steel Stud Wall Analysis Code. This software will allow designers to tailor this approach to variances in blast loading as well as floor heights, stud size/spacing and different cladding options. It is the hope that capability may benefit other organizations and missions.

Russell Norris is an R&D coordinator with the Physical Security Division of the U.S. Department of State, Bureau of Diplomatic Security. Don Allen is the director of engineering development for the Steel Framing Alliance, and technical director of the Steel Stud Manufacturers Association.

CALIFORNIA CODE EXCEPTION HELPS CALIFORNIA FRAMERS

BY DON ALLEN

Recent changes in California’s Title 24 Energy Code may affect steel framers in this state.

Under the 2001 Title 24 Energy Code, a 1-inch layer of R-4 exterior foam insulation was generally required over 2-by-4 framing to meet the mandatory wall envelope energy standards for low-rise residential construction.

This changed for the 2005 energy code, when the requirement jumped to R-6 for 2-by-4 steel framing. However, after a petitioning effort, an exception to the code has been approved by the Energy Commission for low-rise residential construction. This exception allows the continued use of R-4 exterior insulation when the average construction is 18 gauge (43 mil) or lighter steel framing.

What do you need to do? Maybe nothing; a sharp Title 24 consultant working for your builder should pick up on this. However, as you get involved in the early planning stages for the home or community, make sure the Title 24 compliance is in order, as it will save the builder hundreds of dollars per home.

If you see on the plans a requirement by the Title 24 consultant to use R-6, speak up and question why. He or she may have a reason, but make sure the person knows about the exception found at the link listed above. Or, if there is no Title 24 consultant and the prescriptive method of following the code is being followed, point out the exception to the builder so he doesn’t unnecessarily penalize himself.

The next step is getting this exception into compliance software so Title 24 consultants can use it easily. This is in progress for both EnergyPro and MicroPas.

Unfortunately, the exception does not apply for non-residential construction. The thicker insulation requirement is in Joint Appendix IV of the Title 24 Code, Table IV-11.

Don Allen PE is director of engineering development for the Steel Framing Alliance.

Steel Framing Alliance has something to offer construction professionals at every level at Metalcon International 2005.

With eight educational seminars, special programs, a fabulous booth and a better-than-ever STUD University, SFA will a major participant in Metalcon, helping the event celebrate its 15th anniversary.

Plan now to attend these SFA-sponsored seminars:

**Monday, Oct. 3**
8:30 a.m. to 4:30 p.m.

**Design of Wall Systems using Cold-Formed Steel** by Roger LaBoube Ph.D. PE, director at the Wei-Wen Yu Center for Cold-Formed Steel Structures at the University of Missouri-Rolla, and Don Allen PE, SFA director of engineering development. (AIA—7 LU’s [HSW])

This full-day program begins with the basics of cold-formed steel wall framing and takes attendees through multiple systems, installations and examples. These include curtain walls, load bearing designs, stud bracing, slip and drift connections and header design. All examples are centered on the design of steel wall studs in typical commercial and residential loading conditions, including high-wind and high-seismic situations.

A number of new software tools and options are introduced and analyzed. Using the North American Specification for the Design of Cold-Formed Steel Structural Members and the new AISI Wall Stud Standard in design also will be discussed. Architects, structural engineers, designers and those involved with the design of structures that include cold-formed steel wall elements should attend. A general understanding of load paths and building design is helpful. Understanding cold-formed steel design is not required, but may be beneficial for the technical portion of the presentation.

**Tuesday, Oct. 4**
8:30 a.m. to 10 a.m.

**Introduction to Cold-Formed Steel Framing** by Nader Elhajj PE, director of...
the structures and materials division of the National Association of Home Builders Research Center.

Is steel framing a new arena for you and your company? Designed for those who are contemplating an expansion of their company’s offerings to include cold-formed steel, this seminar is a great opportunity to get a firsthand look at incorporating cold-formed steel into their catalogs of client offerings. From identification of cold-formed steel members to many of the common elements for floors, walls and roofs, this seminar will provide a great primer for all who participate. Code officials, design professionals, plan checkers and inspectors, as well as builders and contractors, should attend.

New Code of Standard Practice for the

Cold-Formed Steel Structural Framing Industry by Jeffrey M. Klaiman, senior project manager, Adtek Engineers, and Jay Larson PE, director of construction standards development, American Iron and Steel Institute.

This seminar will introduce the 2005 edition of the Code of Standard Practice for the Cold-Formed Steel Structural Steel Framing Industry. Developed and reviewed by engineers, architects and product manufacturers who are expert in the use of cold-formed steel, this document addresses trade practices for the design, fabrication and installation of cold-formed steel structural framing products. This session will also review the commonly accepted standards of custom usage for cold-formed steel structural products as defined in this document along with accepted norms of good practice.

10:15 AM to 11:45 AM.


Are you frustrated with the lack of qualified labor available in the market today, and the untimely construction site delays that result from being under or poorly staffed? Your solution may be panelization. Attend this session to hear one of the professionals in the industry discuss the steps necessary to evaluate how panelization can work for your next project. From checking the track record of the panelizing company to what to expect during the process, you’ll also learn about shop drawings, responsibilities, approvals, customer service and the final sign-off.

Cold-Formed Steel Shear Wall Assemblies and Connectors by Jeff Ellis PE, branch engineer, Simpson Strong-Tie.

This presentation provides an overview of the development of shear wall design for cold-formed steel construction. It includes a comparison of the similarities and differences of cold-formed steel framed wall requirements for the 1997 Uniform Building Code, the 2003 International Building Code, and the new American Iron and Steel Institute Standard for Cold-Formed Steel Framing, Lateral Design, 2004 Edition.

Wednesday, Oct. 5
8:30 AM to 10:00 AM.

Steel Stud Brick Veneer Systems by Don Allen PE.

Brick veneer over cold-formed steel framing has become a very popular method for exterior wall assemblies. Along with the excellent characteristics and economies of this application, special care must be taken in the design and detailing to ensure adequate performance over the life of the structure. This seminar will address some of the basics of the system and show details. See a real life system in place and get overviews of the technical publications currently available in the marketplace. Architects, engineers, specifiers and installers should attend.

It’s All About Cold-Formed Steel Floors by Nick Camizzi, Marino\Ware

Never before has the cold-formed steel industry been in a position to transform the construction marketplace as it is today, with the continuing expansion of cold-formed steel floor systems. Attend this session to learn the advantages of cold-formed steel floor solutions for projects both large and small. Take a look at cold-formed steel floor applications in association with other construction materials and explore the latest acceptance of steel as a viable opportunity for your next project. From the standard C-joist to the latest in new product development, this session is all about the latest solution for the construction industry.

10:15 AM to 11:45 AM.

Load Bearing Mid-Rise Construction in Cold-Formed Steel by Patrick W. Ford PE, principal/owner, Matsen Ford Design.

Join this seminar for an overview of
commercial and multi-residential mid-rise construction using cold-formed steel as the structural load-carrying frame. Examples of projects spanning up to nine stories high will be shown. Topics will include product uses, structural systems and assemblies, connection details and concerns, combined load-bearing assemblies and serviceability issues. Experienced individuals will learn to identify potential problems and cost issues earlier in the course of a project. Steel-framing professionals, as well as contractors, engineers, architects and code officials who may not work with steel framing every day, should attend.

### Cold-Formed Steel Trusses—Understanding How Today’s Market Functions

by Tom Valvo, president, Aegis Metal Framing.

Attend this session to gain insight on how the pre-fabricated steel truss market operates—both positively and negatively. It will address common truss-related issues from the perspective of the architect, engineer, contractor and fabricator as well as discuss the scope and key elements of a properly designed truss system.

**THURSDAY, OCT. 6**

10:15 A.M. TO 11:45 A.M.


Back by popular demand, this unique program is designed to give insight into the tools, standards and resources available to those individuals in their professions. This special seminar includes a walk-through of the main show structure built on the exhibit floor, which incorporates some of the most up-to-date techniques and details in steel framing today. Following the seminar attendees are invited to tour the exhibit show floor and learn first hand all that steel framing has to offer the construction industry, including new steel framing products, tools and fasteners. Code officials, plan examiners and building inspectors with little or no experience in cold-formed steel should attend.

**Registration for this session is limited to government jurisdictions. There is no charge for this session, however registration is a must!**

### Curved Surface Framing Techniques: Mastering the Third Dimension

by Chuck Mears, AIA, Radius Track.

Building forms and shapes are becoming more complicated as the design envelope is pushed ever outward. Contractors today are expected to build what could only be imagined a decade ago! This workshop focuses on essential techniques needed to understand, design, estimate and fabricate simple and compound-curved shapes for interior and exterior structural curtain wall surfaces. Topics such as basic and 3D surface geometry, field layout tools, new materials, and cost-effective construction methods are discussed. The workshop blends the leader’s diverse business knowledge with his hands-on experience to encourage a practical understanding of the latest innovations in the curved-steel-framing industry.

### STUD U

SFA also presents the third annual STUD University, beginning three days prior to the opening of METALCON, on Oct. 1. STUD U is an intensive 19-hour program covering not only the basics of framing with cold-formed steel but also some of the latest advancements to speed installation. STUD U offers two sessions, designed for the novice and experienced framers:

**Exploration of Cold-Formed Steel Framing in Construction Today (STUD U 101)** is an introductory session offering information about steel the material, including identifying common uses, field applications, nomenclature, the development of steel in building codes and environmental attributes. At the end of the classroom session, STUD U students will divide into teams to build a small structure.

Each STUD U 101 team will be instructed on the identification and proper use of the most common tools by industry experts. Teams will have an opportunity to cut, fasten and model a small structure that will be displayed during the show. Teams will be rotated to the main show structure to work with the experienced builders.

This course is intended for people who have little, some or no construction experience. It is designed for those employed in the building materials area, as well as inspectors, code officials, insurers, realtors, students, remodelers or others with a general interest in the subject. Employees of firms that engage in steel-related industries would also benefit from learning critical issues surrounding the use of steel today.

**Refining Your Construction Techniques using Cold-Formed Steel (STUD U 201)** educates builders, framing carpenters and other construction trades people developing the skills and latest advancements for framing with cold-formed steel. Through a combination of classroom instruction and hands-on training, participants will learn the proper methods and acceptable practices used for residential and light commercial cold-formed steel construction.

Course content includes detailed information on various topics related to cold-formed steel design and standardization, tools, fasteners, bearing and non-bearing walls, roof trusses, floor joists, ordering and delivery, cut lists, green building attributes and more.

STUD U 201 requires construction knowledge—one must be a builder, framer or construction tradesperson to receive the full benefit of this course. Graduation for both STUD U classes will be held on Tuesday, Oct. 4, immediately following the ribbon cutting ceremony opening METALCON International 2005.

SFA will see you at METALCON!
**MASTERFORMAT 2004 - A POWERFUL TOOL**

**BY DAVID GOODWIN**

**MAJOR CHANGES ARE COMING TO THE CONSTRUCTION SPECIFICATIONS WRITING COMMUNITY, ALL BECAUSE OF MASTERFORMAT 2004. IF YOUR BUSINESS IS PROVIDING – OR USING – CONSTRUCTION PRODUCTS OR SERVICES, THE CHANGES INTRODUCED BY THIS NEW STANDARD WILL AFFECT YOU.**

**WHAT IS MASTERFORMAT?**

MasterFormat is the most widely accepted system for organizing construction specifications in use in North America today. It is more than just accepted, it is expected in virtually every major private-sector construction project. MasterFormat is also widely used for public projects. In the United States, MasterFormat provides the basis for the numbering and titling conventions used in the Federal Construction Guide specifications, and it is also used at state and municipal levels. In Canada, the Federal Government’s National Master Specification, which is also used at provincial and municipal levels, is based upon the numbering and titling system of MasterFormat.

MasterFormat is a product of the Construction Specifications Institute and Construction Specifications Canada. CSI was founded in 1948 “to meet the construction industry’s need for a common language and system to organize, store, retrieve, communicate and exchange information.” Standard “divisions” for construction systems were created so that every project manual could have a consistent table of contents. The specification format that we have come to call the “CSI spec” began in 1963 with the publication of a 16-division format titled, the “CSI Format for Construction Specifications.” This Format was to become the organizational backbone of written specifications for more than 40 years. During those many years, while the construction industry went through revolutions in construction products and processes, the CSI Format underwent few changes to keep it abreast of new technologies and materials.

**WHAT IS MASTERFORMAT 2004?**

MasterFormat 2004 (MF04) is an extensive expansion of the 16 construction product/process divisions of the past MasterFormat system. In the creation of MF04, a great deal of priority has been placed on developing a new division system that would give distinct division status to building systems such as communications, lighting, automation and pollution control, to name but a few. Fourteen of the original MasterFormat divisions have been left essentially intact, and many new divisions have been created. (There are 50 Divisions total as of this writing.) The divisional numbering system has been modified by adding another digit, and the previous terminology of divisions and scopes has been replaced with “Levels” (see chart below).

The end result is a divisional system for project specifications that is both sufficiently robust to incorporate many new building products, systems and technologies and sufficiently flexible to allow for the continuing evolution of the construction industry.

**HOW HAS MASTERFORMAT IMPACTED THE COLD-FORMED STEEL FRAMING INDUSTRY IN THE PAST?**

For cold-formed steel framing, paradoxically the good news was the bad news. The
effort culminated with the creation of section 05 44 00—Cold-Formed Metal Trusses within MF04.

**How will MF04 impact our industry?**

The adoption of MF04 will have a positive impact on the CFS framing industry, mainly because it will be a good change for the entire construction industry. MasterFormat has been long overdue for an overhaul, and MF04 will better allow for future growth and change in the industry. Selected product types, such as pre-engineered CFS trusses, will see benefits sooner than most segments of our industry because they will reap the immediate benefits of having a dedicated scope (level) number in MF04.

Full adoption of MF04 will be a long-term process. There will be an early push for acceptance, led primarily by CSI promotions and by the fact that the U.S. government and military, as well as many local agencies, will be early adopters. Early adoption by the specification clearinghouses, such as 4SPECs.com and ARCAT, can help specifiers find product information by allowing them to tap into the greater search power given by the additional division and scope section numbers (now called levels) of MF04.

**How can I use MF04 to my advantage?**

If you are a manufacturer or service provider, a good near-term way to use MF04 to your advantage would be to understand MF04 yourself and help specifiers and contractors understand how your products or services fit into the new specification system. It is inevitable that there will be some difficulties during the transition from the previous MasterFormat to MF04. Colin Gilboy, publisher of 4SPECs.com, a major online specification clearinghouse, says, “I talk to specifiers every day, and many of them are struggling with the new numbering system.” If you offer a guide specification to the design community, you might want to make certain that it shows both the old MasterFormat and the MF04 numbers. If you are listed with a specification clearinghouse, ask them if specifiers can find your spec by searching for either the previous MasterFormat or MF04 numbers.

A long-term strategy to take advantage of MF04 could be to make certain that your guide specifications are available on the Internet. This strategy could be a good move, even without the advent of MF04, but many see MF04 as further empowering specifiers when they search for specifications and product data on the ‘Net. When asked about the future of the dissemination of product specifications, Gilboy says that he forsees continued growth in the trend of specifiers’ relying heavily on the Internet for research. “Eventually this will mean less binders in architects’ offices,” says Gilboy.

Another long-term strategy could be to hone your consultative-selling skills. Spec writers and project designers will still depend on selected vendors for advice and information, perhaps even more during the transition from the previous MasterFormat to MF04. Why does an architect select a particular vendor as an advisor or consultant? “The vendor who gives advice based upon the best interests of the designer and his project,” continues Gilboy, “that is the vendor that gets the return call. Designers want good advice and solid information, not a sales pitch.” You could take that as a definition of consultative selling.

**MF04 – A powerful tool in our tool belt**

For building professionals, MasterFormat 2004 will be another tool in our tool belt. Used clumsily, or for the wrong purposes, it could cause confusion and even damage. But, when used skillfully for its intended use, it could be a powerful tool for shaping the buildings as well as the building industry of the future.

Dave Goodwin, CSI, is national marketing director of the TruSteel Division of Alpine Engineered Products Inc. and also serves on the Board of Directors of the Texas Steel Framing Alliance. He is located in Arlington, Texas.
Safe and Temperate Construction with Steel Framing

Are there safety or health manuals pertaining to the manufacturing of cold-formed steel in the plant or the use of the cold-formed steel in the field?

The International Code Council has produced information required for quality control procedures for the manufacture of steel framing. It is available at the following Web site: http://www.icc-es.org/Criteria/ac.shtml. The criterion for quality control is AC10, and the criterion for studs and track is AC46. However, there is no listing pertaining to safety and health in manufacture; these are primarily for quality control and consistency in the manufacture of the product.

There are other organizations, such as the American Welding Society, that may have specific manuals that deal with safety in welding, but this is only one of several processes that are used in steel-framing manufacture and field use.

The best bet may be one of the framing guides from the Steel Framing Alliance. The Steel Framing Alliance has several field guides, including a Steel Wall Guide and a Steel Floor Guide. Although not specifically designed for health and safety, these guides give some best practices that can lead to a safer structure, as well as jobsite safety. However, using framing manufacturer and tool manufacturer instructions and guidelines are often your best bet both in the factory and on the jobsite. Manufacturers are required to maintain Material Safety Data Sheets. These documents are available on the Web sites of some of the framing and fastener manufacturers.

Thanks again for your inquiry!

I have a new house that is framed with steel, but I am concerned about thermal bridging. Even though the construction is mostly complete, what are some things I could do to prevent or reduce the thermal bridging that might be expected? The builder used only cavity batt insulation. I know that is all that is required in this area as per code, but I wanted to see if I could do a little better than that and help reduce my energy bills.

Thank you for your question. However, I may not have a good answer for you. I have seen retrofits on wood-framed houses where thermal issues and thermal bridging were a problem, so the same methods would work for steel. These were, however, rather radical solutions, which involved installing either an Exterior Insulation Finish System over the existing exterior finish, or adding foam insulation and vinyl siding over the exterior. With each of these, there were also some finish issues—exterior wood or other siding that was deteriorating and needed painting, or other thermal and moisture concerns—so by adding additional insulation and finish to the outside, they were able to cover this up.

I am reluctant to recommend any insulation or additional material on the inside of the wall. The reason for this is that this tends to force the dew point (temperature at which water vapor condenses) to a location inside the wall cavity. Water condensing in the wall can be bad for steel, insulation, wood and other building materials, as well as promote the growth of mold.

For a less radical retrofit, you may want to consult with an insulation installer. There are several new methods of insulation placement, including pouring insulation in from the top of the wall, blow-in and foam-in, which could possibly work.

Thanks for the information; I’ll check with the insulation installer. As a follow-up question, if I were starting from scratch with a new structure, what are some things I could have my builder do to address the thermal bridging issue?

For this, I defer to my colleague Shelton H. Cartwright Jr., research analyst for the National Association of Home Builders Research Center, who deftly handles many of the questions that come through the Steel Hotline.

Cartwright says: “The thermal bridging question in cold-formed steel had been researched and addressed starting in the early 1990s. A publication available online, Thermal Design of Cold-Formed Steel Exterior Walls, provides suggested insulation levels and wall system descriptions. In addition, the International Energy Conservation Code 2003 edition has a chapter describing the prescriptive requirements for single-family homes, and Table 602.1.1.2 in that chapter has the values for steel-frame walls.

“Thermal bridging is not unique to steel framing. This is a natural occurrence and bridging problems are known to occur in wood-frame homes, as Don Allen has pointed out. Let me briefly explain some of the physics behind all this. Heat flows from warmer areas to colder areas until an overall equal temperature is established. Heat moves in one of three ways: conduction, convection, and radiation.

“In the case of thermal bridging, the fight is with conduction; think of a spoon in a pot of boiling water; conduction will make the end of the handle hot. So, a wood or steel stud conducts heat from the inside to outside (winter) and outside to inside (summer). To ‘break’ the flow, the idea is to install a material that serves as a gap to slow down the rate of conduction. In the case of steel, install foam sheathing because it has a higher R-value than OSB or plywood.

“The R-value of that sheathing (and thus the thickness) will depend upon the heating degree days (HDD) for the site location and the amount of wall insulation installed inside the cavity. From table 602.1.1.2 the minimum R-values for up to 1,900 HDD is R-3 with R-21 cavity insulation, or R-4 with R-15 cavity insulation or R-5 with R-11 cavity insulation.”

Thanks for both of your good questions!
ONE AWARD-WINNING BUILDER OF HIGH-END LUXURY HOMES DECIDED ITS PROJECTS COULD BE EVEN NICER BY SWITCHING TO COLD-FORMED STEEL PANELIZATION FROM TRADITIONAL WOOD CONSTRUCTION.

Bay Homes, based in Hilton Head, S.C., is currently using panelization in the construction of four 4,000-square-foot custom structures in Beaufort County, S.C. It marks this company’s initial venture away from traditional wood materials.

“This is our first experience with panel systems,” says Jeff Schafstall, project manager for Bay Homes. “Several years ago at customer’s request, we stick-built a steel-framed home, but this is the first time we’ve approached it on a normal level, as far as using it as a replacement for wood.”

They were sold on steel by PanaSteel, a Savannah, Ga.-based company that develops and panelizes pre-engineered cold-formed steel framed homes for residential builders. PanaSteel, founded in 2003, is one of a number of growing companies throughout the country that are finding tremendous success in residential building with steel panels.

PanaSteel promotes steel’s inherent qualities—including durability, non-combustibility, green attributes and termite resistance—as well as a proprietary panelization system that emphasizes preparation and precision. The architects, designers and home builders supply the home plans to PanaSteel, which generates an “engineered-home package” and returns an estimated cost for materials and installation. With design software designed for flexibility, it creates a home plan that labels and precisely fits each steel component.

“All the changes can happen in the design phase,” explains Edwin Berrios, president and CEO of PanaSteel. “And our system allows us to view the structure in 3D so we can do a full walkthrough in that stage. Once we get signoff in the design and everybody’s happy, we take it to production.”

Based on the engineering plan, the cold-formed steel is cut and loaded on machines that align studs precisely and join frames using a process that preserves the galvanized finish. All openings for doors and windows are pre-engineered at the factory. Wall and floor panels can be chased for utility and plumbing systems. After inspection, the sections of each home are packaged in the order of their assembly and shipped to the construction site for erection.

This entire process takes two to three weeks on homes like the ones Bay Homes is building, according to Berrios. And it leads to a framing process that, once perfected, can be more efficient than wood framing.

“Seventy-five percent of the framing is assembled offsite, so what you’re getting on the job site is a big Lego set, if you will,” says Berrios. “It allows for cleaner erection of the structure.”

Bay Homes’ four steel-paneled homes are located in Colleton River Plantation in Bluffton, at Burke’s Beach on Hilton Head, in Oldfield Plantation in Okatie and on Dataw Island.
Construction, which began in mid-June, has been smooth, says Schaffstal.

A very minor learning curve came along with customer-requested modifications on the homes’ numerous architectural details, including barreled and coved ceilings. But that was reduced with PanaSteel’s onsite training of Bay’s crew and ongoing support, he says.

“So far so good,” says Schafstall. “We’ve had a couple of bumps here and there, just because of our experience. But PanaSteel has reacted to all of our concerns, and I think we’ve got everything on track.”

Why such limited experience with steel in the past?

Schafstall says it’s only recently that steel prices have come down to where they’re competitive with wood. Still, the company had its eye on steel for some time because of its benefits.

“We had been looking at steel for quite a while, and had been approached by some of PanaSteel’s outside salespeople,” says Schafstall. “We didn’t do anything for quite a while. But then we visited the plant, liked the product, and decided to give it a shot.”

Berrios says he’s confident Bay Homes and others who try cold-formed steel panelization are sure to be pleased with the step-by-step installation process and cleaner job site, as well as the lasting durability of their homes the panelization provides.

“The system can indeed work better than traditional methods,” says Berrios, “and progressive builders like Bay Homes are not getting caught in the quagmire of doing things the old-fashioned way.”

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**LGSEA Transition Moves Along**

Leadership of the LGSEA has taken major steps forward in implementing the new Steel Framing Alliance Council, including planning for a wide range of upcoming activities.

An interim board for the LGSEA convened in California on Aug. 2, and set short-range goals for programs and publications.

Coordination between this leadership team and the Alliance was formalized as Wei Pei, chairman of the interim board, was appointed representative for LGSEA on the SFA Operating Team.

The LGSEA issued its first newsletter to members since the transition vote, informing members of details of the transition, as well as costs, benefits and chapter perspectives from both active LGSEA chapters.

A nominating committee was appointed, and is now working through the selection process for individuals to become board members and LGSEA officers.

A 30-day election process for directors and officers began in August, with officers to be installed at the annual membership meeting in October.

Planning has begun for the LGSEA annual membership meeting, to be held in conjunction with METALCON.

At this annual membership meeting and awards luncheon, members will be recognized for their service during the 2004-2005 year. Also, information on what members can expect during the coming months will be presented, with question and answer sessions for all participants. LGSEA task groups will give presentations on what progress is being made on technical materials, such as Tech Notes, presentations and online seminars.

After the awards presentations, the highlight of the luncheon will be the installation of the newly elected LGSEA officers and Board of Directors.

Currently, the interim board is providing the day-to-day supervision of the association. This interim board will have its final meeting on Oct. 4, in preparation for turning over the leadership to the new officers on Oct. 5. All LGSEA and SFA members and guests are invited to the luncheon on Oct. 5 in Rosemont, Ill.
STEEL FRAMING WAS A KEY COMPONENT ON A RECENTLY CONSTRUCTED ARCHETYPE HOME INTENDED TO FIND SOLUTIONS FOR LOW-INCOME FAMILIES.

With engineering expertise donated by Steeler Inc., the steel became an integral part of an innovative design pairing regional, energy-conserving wall materials with an efficient, termite-resistant roof system.

The rammed earth and steel project was conducted by the Drachman Design-Build Coalition, a non-profit housing provider that links The University of Arizona College of Architecture and Landscape Architecture faculty and student technical expertise with the surrounding community to produce prototypes of energy-efficient, low-cost dwellings.

DDBC has designed and built one dwelling for low-income homeowners per year since 2000. Each dwelling features different design and construction strategies and material choices intended to lower the initial cost of the residence and to control the long-term operation and maintenance costs for the homeowner.

Some of the strategies include:

- Minimizing conditioned indoor space and maximizing covered outdoor space, to extend living area while controlling cost.
- Orienting door and window openings to north and shading south sides of dwelling to prevent unwanted solar gain.
- Orienting sheltered outdoor spaces to take advantage of seasonal comfort levels.
- Incorporating landscaping to create outdoor rooms and shade appropriate walls, windows and doors.
- Choosing materials to optimize either high-insulation or thermal mass strategies for controlling indoor comfort level while using less energy for cooling and heating.
- Choosing materials with long life spans and low maintenance demands.
- Designing construction methods that use less equipment and initial investment.

Each prototype is permitted as a model residence and is intended to disseminate of strategies into the community and for direct use by other non-profit and for-profit homebuilders.

The first residence built under DDBC’s newly incorporated non-profit status, DDBC Residence 1 will house a family with an annual income below 80 percent of the mean for Tucson, Ariz.

DDBC has partnered with Chicanos Por La Causa to bring a local family through CPLC’s homeownership courses and budget counseling into this unique residence designed to reduce utilities and maintenance costs.

This design, drawn and constructed by students and faculty of the School of Architecture at The University of Arizona, serves as an energy-conscious prototype for the long, narrow lots with
predominantly east-west solar exposure so commonly found in Tucson.

It is difficult to control unwanted solar gain when most of the exterior wall and window area faces east and west. DDBC Residence 1 has an 18-inch-thick rammed earth wall along the 77-foot-long west exposure, with no openings for solar gain.

The south and most of the east walls are rammed earth as well, with the protected north wall and east wall under the carport roof built as steel frame with operable windows or translucent polycarbonate sheathing. The steel frame married well with the rammed earth walls, requiring no intervening waterproofing layers as wood framing does. The 48-inch framing module, made possible by the strength of steel, allowed more light to pass through the translucent panels to the interior of the house. With no wood products used in the construction, the severe termite problems of the region are not an issue. A large, sliding door panel opens the living room up to the carport space, which doubles the public space for the eight months of the year when it is pleasant to live outside in Tucson.

The thermal mass of this wall behaves as an energy flywheel, slowly gaining heat during direct sun exposure but reradiating it into the cool night sky before it can enter the interior of the home. This strategy is particularly well suited to hot, and regions like the Sonoran Desert.

Mary Hardin and John Folan are professor of architecture and assistant professor of architecture, respectively, at The University of Arizona.
Steel is the Framing Product of Choice at the Grovenor House High-Rise Condominium Project, Currently Under Construction in Coconut Grove, Fla.

The Trakloc steel-framing system was well suited for the standard layout of the 32-story Grovenor high-rise condo building in Coconut Grove, Fla.

The project benefitted from the Trakloc framing system of telescoping and standard steel studs that snap into a track, manufactured by SFA member Trakloc Southeast, of Hendersonville, Tenn.

Installation was performed by Miami Drywall whose experience with steel framing spans 35 years.

A crane lifts a floor’s worth of stud and track to the installation site. Each of the Grovenor project’s 32 floors called for approximately 21,000 lineal feet of product, about 16,000 of which were studs.
CURVED STUD TRACK PRODUCTS ALLOWED FOR STRIKING DESIGN EFFECTS IN TWO RECENT PROJECTS IN DIFFERENT PARTS OF THE COUNTRY.

In Tampa, the company’s new Flex-C Plate product was used to construct a groin vault ceiling in the foyer and combined living- and dining-room areas of an 8,200-square-foot Mediterranean-style spec home.

To use the Flex-C Plate, the builder created a plywood template and bent the track to conform to the jib, then screwed it to maintain the shape. The main ribs of the groin vault consisted of 2-inch-by-6-inch Flex-C plate back to back. The barrel area of the vault was then filled in with metal hat channel. The framing was covered with two layers of 1/4-inch drywall and finished to a level 5.

Flex-C Plate is made of 33-mil galvanized sheet metal and is available in 2-inch-by-2-inch and 2-inch-by-6-inch widths.

More than 11,000 linear feet of Flex-C Trac, manufactured by SFA member company Flex-Ability Concepts, were used with metal studs to create intricate curves and a radii for a dramatic ceiling effect over a gaming area at the new Cherokee Hotel and Casino in Tulsa, Okla. Flex-C Trac is used primarily for commercial construction and is available in 2 1/2-inch, 3 5/8-inch and 6-inch widths for metal studs. The 6-inch product is also available in 54-mil.

The interior design features traditional Cherokee symbols while incorporating the art deco style for which Tulsa is famous.