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Seventh International Specialty Conference on Cold-Formed Steel Structures
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HOW TO ENSURE QUALITY CONSTRUCTION IN
LIGHT STEEL FRAMING

by

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A CONTRACTOR'S VIEWPOINT

ABSTRACT

by

J. Patrick Boyd

The question of quality in the use of light steel framing systems has perplexed owners, design professionals, manufacturers, and contractors on an expanding scale due to its recent popularity. This type of framing is being used in both residential and commercial construction for load bearing, curtainwall, and non-load bearing applications. As in any new growth industry, the potential for problems exist. However, the pitfalls for the light steel framing industry seem to be expanding exponentially. With quality as the goal, a team must be assembled to design, manufacture, install, and monitor all light steel framing for any given project. As with any team, its strength is only as great as that of its weakest member. Design professionals must begin by preparing the contract documents. These documents should include all design, detail, and product specification information to present, to the contractor who must install, a complete picture of the desired goal. Designers may be assisted by manufacturers who will provide to the design professional all pertinent information concerning the physical properties and composition to allow the safe and efficient use of their products. Dependent upon the size, scope, and other factors, a manufacturer may provide the design and details for the project. The role of the contractor is to provide the bridge between the intent of the contract documents and the reality of a functional finished project. The contractor must first interpret the contract documents and determine all costs. He then selects, by specification or by his own experience, a light steel manufacturer with the capability and integrity to fulfill the requirements shown. The main areas of concern for quality are successful interpretation of the drawings, especially if drawings are unclear or incomplete, complete knowledge of light steel framing techniques and details to understand not only how to accomplish the job but also why the framing is different from other types, and the availability of a trained, properly supervised work force to install the work. Finally, the establishment of a set of tolerances for light steel framing would greatly assist all parties in performing knowledgeable and consistent inspection of the work. Close coordination among all team members will result in a high quality product that is reliable and economical and will withstand not only the onslaught of time, but also the constant criticism from proponents of alternative systems that see their market being taken.

HOW TO ENSURE QUALITY CONSTRUCTION IN LIGHT STEEL FRAMING

OUTLINE

- I. Contract Documents
 - A. Specifications
 - B. Design
 - 1. Primary structure
 - 2. Sizing common members
 - 3. Erection ease
 - 4. Responsibility of design professional
 - 5. Performance specifications; be sure you really get performance
 - 6. Deflection; generally more critical than stress
 - 7. Avoid overdesign; it encourages cutting corners
 - C. Details
 - 1. Welds
 - 2. Bridging
 - 3. Attachment to primary structure
 - 4. Restraint of primary structure
- II. Manufactures
 - A. Proper materials
 - 1. Thickness
 - 2. Tolerances
 - 3. Galvanizing
 - B. Design Services
 - 1. When to provide
 - 2. Ultimate responsibility
- III. Contractors
 - A. Competency
 - 1. Price should not necessarily be the only factor
 - 2. Check for apples to apples in you bid
 - 3. Watch the fine art of cutting corners
 - 4. Knowing why as well as how
 - 5. Welding
 - B. Tolerances
 - 1. Ill-defined to non-existent
 - 2. Different for the primary structure than the secondary structure
 - C. Inspection
 - 1. Knowledgeable
 - 2. Consistent
 - 3. Frequent
 - D. Response to Changes and Problems

SEVENTH SPECIALTY CONFERENCE

A STRUCTURAL ENGINEER'S VIEWPOINT

ABSTRACT

by

C. R. Clauer

Introduction: Although cold-formed steel framed building construction has been used for many years, its popularity among architects, engineers, and contractors has increased remarkably in the last five to ten years. Even so there are many of these practitioners who are unaware of the features and benefits of this type of construction and prefer to stay with more conventional construction if possible. This presentation is to familiarize them with the product, show how to use it to get quality construction and remove the fear surrounding its use.

There are just a few simple requirements to follow:

1. Become familiar with cold-formed steel framing by reviewing product literature.
2. Engage a registered professional structural engineer familiar with the product to design the cold-formed steel portion of the project. Most structural engineers are not familiar with cold-formed steel framing design - a specialist may be needed.
3. The engineering design drawings should be of large enough scale and with enough sections and details to clearly show what is required. These drawings should be supported with certified engineering calculations.
4. The field erection drawings (shop drawings) should be of large scale, complete with plenty of sections and details.
5. Inspection of cold-formed steel construction by a registered professional engineer, preferably the design engineer, is a must. Following this there should be a final inspection, punch list, and sign off by the inspecting engineer certifying that the cold-formed steel construction as erected complies with the plans, specifications and the applicable building code.

Conclusion: Quality building construction in cold-formed steel may be readily attained through the employment of experienced professional structural engineers who will design and detail the job, follow through with inspection of construction, and certify compliance with plans, specifications and building codes.

THE CODE OFFICIAL'S VIEWPOINT

ABSTRACT

by

J. S. Traw

To address the issue of how to ensure the quality of construction using light steel framing, one must determine:

1. The participants in the construction process.
2. Participants impact on the quality of the construction.
3. External factors which influence participants commitment to construction quality.
4. Participants perception of quality.

Ensuring quality in the end product, i.e. the building or structure, does not rest with but one or two of the participants. It is the responsibility of all involved in the construction process. The degree of responsibility and the resulting effect on the end product will of course vary, along with the extent to which each participant might effect a change in the level of quality.

Perception of quality is goal oriented and influenced by external pressures. A goal of minimum structural safety and function can differ from a one based on aesthetics. Further modified by monetary considerations and the individual judgement of the participant.

To the code official, the goal is minimum standards for structural safety and performance. To the owner, cost of the project and the economic success of the project are the major considerations. For the others involved in the construction process, architect, engineer, contractor and subcontractor, the desire goals are maximum safety, function and aesthetics within the constraints of the owner and code official.

Improvement in the quality of construction employing light steel framing can be accomplished by recognition and understanding the forces which motivate the participants in the construction process. Quality demands competence in all phases of the construction process and by all participants. A firm grasp of the present state of the art in construction and potential deficiencies is needed if the quality of construction is to continue to improve.

A MANUFACTURER'S VIEWPOINT

ABSTRACT

by

D. R. Wootton

In order to assist in assuring quality construction in the light weight steel framing industry the manufacturers of these structural framing components must accept the responsibilities expected of them by the designers, builders, owners, and general public. These responsibilities should include meeting both the material and fabrication standards as set forth by specifying bodies such as AISI, ASTM, Federal Specifications, or other industry standards. Additionally, any technical data or services provided must also conform to the governing specifications.

The material specifications to be followed by the manufacturers in their procurement of the steel sheets are set forth in Section 1.2 of the AISI Specification for the Design of Cold-Formed Steel Structural Members. The specification clearly identifies the types of steel that may be used for cold-formed structures by giving ASTM designations, or in the case of other steels, setting forth specific physical and chemical requirements. The important attributes of the steel sheets would include their yield point, tensile strength, ductility, thickness and finishes.

Having the specified structural steel sheet, the manufacturer then fabricates the individual framing components. This is usually accomplished by rolling-forming the primary shapes such as studs and joist and press-braking of other special shapes and some accessories. It is of the utmost importance that the fabricating equipment be properly maintained and controlled so that when the material arrives on the job each component's length, camber, bow, punch-out alignment and corner radii are as ordered or within the accepted tolerances.

Finally, any descriptive literature containing product data, load tables, details, or erection specifications must be derived from the current design and/or installation specifications. In the absence of a universal design publication such as the AISC Steel Construction Manual, the cold-formed framing literature distributed by manufacturers is often used by both designers and builders and must therefore be accurate.

