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Education in Cold-formed Steel Structures - Lifelong Learning

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EDUCATION IN COLD-FORMED STEEL STRUCTURES - LIFELONG LEARNING

by Albert L. Johnson[1]

What is the system we're dealing with? Who's in the audience? What is the information we need? How do we package it? How is it delivered? How do we know if we've done a good job?

Understanding the System

Formal education is generally in a very specific area of knowledge. However, it is important for individuals working in their areas of special expertise to gain an appreciation for the others involved in the entire cycle of cold-formed steel construction, thus enhancing the potential for optimizing cost and quality.

In addition to the obvious and often cited blend of materials, design, and manufacturing specialists, several participants must be added for a complete understanding of the system: market analysts, architects, specifying agencies, codes and standards authorities, plans examiners, building inspectors, financial community, insurance industry, fire protection specialists, structural designers, construction engineers, engineering technologists, construction trades, . . . the list goes on.

And don't forget the customer! And the occupant!

Who is taking care of the structure?

Who gets to recycle it at the end of its useful life?

Think systems!

A Multitude of Audiences

All of the aspects of the system identified above represent a potential audience (say, those with a need to know, whether they know it or not). Most of those audiences have changing needs. Add the continuous generation of new information, and the regular addition of new talent.

Consider the life cycle of the engineer. Something prompts a student in high school to acquire the necessary prerequisites for a technical education, and the motivation to seek further study in college. Maybe the beauty of bridges attracts the student to

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concentrate in civil engineering, giving an emphasis to structures. After graduation, somehow that young engineer becomes involved in cold-formed steel structures -- say as a design engineer in a manufacturing company.

The knowledge base keeps changing and growing -- and the young engineer must keep pace.

Responsibilities increase, and accountability for efficient products and significant profits grows.

A continuous process of acquisition and application of knowledge becomes the lifestyle of the successful engineer.

What makes this process possible? How can it be helped along?

Generating the Information; Putting It in a "Package"

Recognition of a need for information on the behavior of a new material, an untried structural configuration, an unassessed loading condition -- are all straightforward causal factors in the generation of new knowledge.

Appropriate recording of this knowledge can be a vital part of the education process. Our goal should be to make it readily accessible to others -- "user-friendly".

Sound Basis for Understanding Cold-Formed Steel Structures

The cold-formed steel engineer should be equipped with the basics of engineering disciplines in metal structures, including materials, mechanics, strength of materials, structural analysis and design, and the mathematical and computational techniques to support these topics. A background in plate and shell behavior is an asset in developing a good understanding of coldformed member behavior.

Good knowledge of the methods of manufacturing cold-formed steel members, especially cold roll forming, will improve efficiency of conversion of the flat rolled steel mill product into the cold-formed member, and should add to overall quality and optimum costs.

Completion of construction calls for knowledge of the techniques for assembling the members into subassemblies and total structures, including welded and adhesively bonded joints, and bolted or screw fastened connections. This portion of the knowledge base should include the interfaces between cold-formed steel members, other steel structural forms, and structures of other materials.

Round out the knowledge basis with development of skill in fire protection, acoustics, durability, and serviceability.

It's clear that these talents are not all fully developed in the undergraduate engineering curriculum; therefore we need to pursue continuous, lifelong acquisition and application of knowledge!

The Delivery Systems

The formal education infrastructure needs to be used to best advantage. The curriculum is crowded now, and will become more crowded as time goes on. The production and manufacturing industries, engineering design offices, and the construction industry all serve themselves well by serving the engineering colleges well. Industry's needs should be well articulated to the engineering schools, and industry should lend and nurture strong support to the schools.

Sponsored, ad hoc, applied research programs at universities are a time-tested means of supplying a cadre of engineers versed in steel -- as well as providing answers to real problems.

Let's not ignore the important role played by short courses, seminars, and specialty conferences.

The educational benefits of active participation in professional societies, research councils, and standards writing groups must be underscored.

Experience, on-the-job learning, and mentoring may be the most valuable delivery system of all.

Have We Done the Job?

Can we stand back, and say that we've done it all? That we have the best technology transfer system possible?

No! We must plan strategically to maximize the benefits of education, and keep stretching -- continuous improvement and lifelong learning!