ANGHEL SALIGNY ROMANIAN ACADEMY AWARD - For the book: Dubina, D., Ungureanu, V., Landolfo, R. DESIGN OF COLD-FORMED STEEL STRUCTURES

Dan DUBINA, Viorel UNGUREANU, Raffaele LANDOLFO, Design of Cold-formed Steel Structures, ECCS (ISBN: 978-92-9147-107-2) - Wiley-Blackwell-Ernst&Sohn (ISBN: 978-3-433-02979-4), ECCS - European Convention for Constructional Steelwok, 2012.

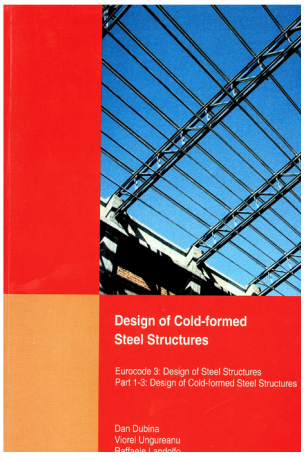
Summary

The book, of more than 650 pages, is concerned with design of cold-formed steel structures in building based, mainly, on the Eurocode 3 package, particularly on EN 1993-1-3. It contains the essentials of theoretical background and design rules for cold-formed steel sections and sheeting, members and connections for building applications. The peculiar behaviour characteristics of thin-walled cold-formed steel sections and their implication in design approaches are emphasised and clearly explained. Both theoretical and relevant technical contributions of the authors are integrated within the book chapters. Elaborated examples and design applications - more than 200 pages, accompanied by design oriented flow charts - are included in the respective chapters in order to provide a better understanding to the reader.

Purpose and Motivation of the book:

The use of cold-formed steel members in building construction began in the 1850s in both the United States and Great Britain. In the 1920s and 1930s, acceptance of cold-formed steel as a construction material was still limited because there was no adequate design standard and there was limited information on material use in building codes. One of the first documented uses of cold-formed steel as a building material is the Virginia Baptist Hospital, constructed around 1925 in Lynchburg, Virginia, USA. 20 years later, only, Lustron Corporation built in Albany, New York, 2500 steel-framed homes, with the framing, finishes, cabinets and furniture made from cold-formed steel. These inexpensive houses were built for the veterans returning from the World War II. This was the beginning of cold-formed steel adventure in building.

In recent years, cold formed steel sections are used more and more as primary framing components. Wall stud systems in housing, trusses, building frames or pallet rack structures are some examples. As secondary structural systems they are used as purlins and side rails or floor joists, as well as in building envelops. Cassette sections in modern housing systems play simultaneously the role of primary structure and envelope. Profiled decking is widely used as basic components in composite steel-concrete slabs.



Cold-formed steel members are efficient in terms of both their stiffness and strength. Additionally, because the base steel is thin, even less than 1 mm thick when high strength steel is used, the members are lightweight. The use of thinner sections and high strength steel leads to design problems for structural engineers which may not normally be encountered in routine structural steel design. Further, the shapes which can be cold-formed are often considerably more complex than hot-rolled steel shapes, such as I sections and plain channel sections. The cold-formed sections commonly have mono-symmetric or point symmetric shapes, and normally have stiffening lips on flanges and intermediate stiffeners in wide flanges and webs. Both simple and complex shapes can be formed for structural and non-structural applications.

Cold-formed steel design is dominated by two specific problems, i.e. (1) stability behaviour, which is dominant for design criteria of thin sections, and (2) connecting technology, which is specific and influences significantly the structural performance and design detailing. Special design standards have been developed to cover the specific problems of cold-formed steel structures. In the USA, the Specification for the design of cold-formed steel structural members of the American Iron and Steel Institute was first produced in 1946 and has been regularly updated based on research to the most recent 2007 edition, AISI S100-07, entitled North American Specification for Design of Cold-Formed Steel Structural Members. In Europe, the ECCS Committee TC7 originally produced the European Recommendations for the design of light gauge steel members in 1987 (ECCS, 1987).

This European document has been further developed and published in 2006 as the European Standard Eurocode 3: Design of steel structures. Part 1-3: General Rules. Supplementary rules for cold-formed thin gauge members and sheeting (EN 1993-1-3, 2006). In Australia and New Zeeland, the last version of specification for the design of cold-formed steel structures, AS/NZS 4600, was published in December 2005, and the review of cold-formed steel design specification could be continued around the world.

The market share of cold-formed structural steelwork continues to increase in the developed world. The main reasons can be found in the improving technology of manufacture and corrosion protection which leads, in turn, to an increased competitiveness of resulting products as well as new applications. Recent studies have shown that the coating loss for galvanized steel members is sufficiently slow, and indeed slows down to effectively zero, than a design life in excess of 60 years can be guaranteed. The range of use of cold-formed steel sections specifically as load-bearing structural components is very wide. Besides building applications, cold-formed steel elements can be met in the Automotive industry, Shipbuilding, Rail transport, in Aircraft industry, Highway engineering, Agricultural and Industry equipment, Office equipment, Chemical, Mining, Petroleum, Nuclear and Space industries.

Interested Public

The book was conceived primarily as a technical support for structural engineers in design and consulting offices, but it is expected to be of interest and useful for students and staff members of structural engineering faculties, as well as, for engineers working in steelwork industry.

Reviews

The authors are clearly extremely experienced in the structural design and behaviour of cold-formed steel and they are also deeply knowledgeable about the content of EN 1993-1-3. The credentials of the authors and fact that the book forms part of the ECCS series of Eurocode Design Manuals means that this will become an authoritative text for engineers with an interest in the design of cold-formed steel (The Structural Engineer, 1 July 2013).

The authors

Dan Dubina, corresponding Member of Romanian Academy, is professor and head of the Department of Steel Structures and Structural Mechanics at the Politehnica University of Timisoara, Romania. He has published more than 400 scientific papers and 25 books in the field of cold-formed steel structures, steel structures in seismic areas, structural connections, and structural analysis. He is a member of the ECCS Technical Committees TC 7 (Cold Formed Thin Walled Sheet Steel in Building), TC 8 (Stability), TC 10 (Connections), and TC 13 (Seismic Design). He has been awarded with the ECCS European Steel Design Award twice.

Viorel Ungureanu is professor at the Politehnica University of Timisoara, Romania. His experience in the field of steel structures, light steel structures, rehabilitation and sustainability of constructions is reflected in more than 200 scientific papers and 15 books and edited volumes. He participated in the drafting teams for the Romanian design code and technical regulations for steel structures. He is a member of the ECCS TC 7 (Cold Formed Thin Walled Sheet Steel in Building) and TC 14 (Sustainability and Eco-Efficiency of Steel Buildings).

Raffaele Landolfo is professor of structural engineering and head of Head of Department of Structures for Engineering and Architecture University of Naples "Federico II". He is external examiner for MSc in earthquake engineering and structural steel design at the Imperial College London and he also teaches in several PhD and master courses. He was engaged in the activities of both national working groups and European project teams dealing with the conversion from ENV to EN of the EN 1993-1-3, and he is chairing the ECCS Technical Committee TC 13 (Seismic Design).

According to WorldCat data base, the 2012 and 2013 editions of the book are already present in 121 libraries Worldwide.