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AUTOMOTIVE STEEL DESIGN MANUAL COMPUTERIZED APPLICATION AND REFERENCE SYSTEM

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The article on "Torsional Warping Constants of Cold-Formed Steel Sections" [1] in the August 1995 issue of the CCFSS Technical Bulletin stated that the computer software package AISI/CARS had been used to verify the correctness of the results obtained from the equations presented. AISI/CARS, the Computerized Application and Reference System was developed by Desktop Engineering Int'l, Inc. for the American Iron and Steel Institute (AISI) and the Auto/Steel Partnership, and was planned primarily for the automotive industry. The Auto/Steel Partnership is composed of Chrysler, Ford, General Motors and thirteen North American steel companies. CARS is based on AISI's 500 page Automotive Steel Design Manual (ASDM) [2] which was first published in 1986. The ASDM is in loose-leaf notebook form to permit easy addition of new information, and is currently being updated for the fifth time. AISI/CARS 3.1, the computerized version of the Third Update of the ASDM was released in 1991; AISI/CARS 4.1 is the current edition. A Windows version of the program, CARS '96, will be available this Spring. CARS '96 will permit DXF data input, which allows users to transfer information from AUTOCAD software directly into the CARS program.

AISI's first venture in the area of automotive structural design was a 35-page pamphlet which appeared in 1981 entitled "Guide for Preliminary Design of Sheet Steel Automotive Structural Components." The objective was to help the automotive companies reduce the weight of their vehicles and meet Corporate Average Fuel Economy (CAFE) requirements promulgated by the government. The Guide was based on the AISI Specification for the Design of Cold-Formed Steel Structural members with the factors of safety removed to provide the automotive engineer with an estimate of the ultimate strength of the component. In 1985 a General Motors executive suggested that AISI should do more in this area, which led to the development of the Automotive Steel Design Manual, and subsequently AISI/CARS.

CARS has a Reference Mode and an Application Mode. The reference mode is essentially a paperless reference manual. Using state-of-the art information handling techniques, it quickly and selectively accesses over 500 pages of text, design procedures, tables, equations, figures and other information found in the ASDM. It also provides database operations, such as keyword searches and report generation. By reducing the amount of time spent searching for applicable design information, the designer and engineer can be more productive.

The Application Mode provides numerical and graphical solutions to all the equations and design pro-

Continued on page 2

[1] Schuster, R.M., L. Xu, and N. Aroutzidis (1995), "Torsional Warping Constants of Cold-Formed Steel Sections," CCFSS Technical Bulletin, Center for Cold-Formed Steel Structures, University of Missouri-Rolla, Vol. 4, No. 2, August 1995.

[2] American Iron and Steel Institute (1993), Automotive Steel Design Manual, Revision 4.1, Southfield, MI, August 1993.

Continued from page 1

cedures found in the ASDM. Parametric studies of any equation can be performed before continuing with the design procedure. By reducing the possibility of error and optimizing design, productivity of designers and engineers can be increased.

Two of the most important features of the CARS program are the GAS module and Key. GAS, the Geometric Analysis of Sections, calculates the nominal and effective section properties of any arbitrary thin-walled section at any prescribed stress level. Key is an expert system which automatically selects appropriate design procedures and equations.

The Automotive Steel Design Manual and the Computerized Application and Reference System were developed for the automotive industry based primarily on design procedures established by the cold-formed steel construction industry. Recently, Tri-Chord Systems, Inc. of El Cajon, California, has used CARS to develop cold-formed steel framing designs for building construction using novel component shapes and a type of connection used in the automotive industry.

Thus the technology has gone full circle, from construction to automotive and back to construction.

Additional information on AISI/CARS is available from AISI, 2000 Town Center, Suite 1900, Southfield, MI 48075, Telephone: 810-351-2664, or the CARS hotline: 1-800-888-8680.

LIGHT GAUGE STEEL FRAMED SHEAR WALLS: RECENT TESTS

by Reynaud Serrette, Light Gauge Steel Research Group, Santa Clara University, Santa Clara, CA 95053

The first part of a comprehensive, rigorous test program to evaluate the static and cyclic racking resistance of light gauge steel framed shear walls has recently been completed. The program was sponsored by American Iron and Steel Institute with technical advice provided by the Light Gauge Steel Engineers Association. The purpose of this article is to provide a general summary of the test program and results.

The wall assemblies evaluated in the program included 4 ft. x 8 ft. and 8 ft. x 8 ft. walls with panels parallel or perpendicular to framing, and panels on both sides of the wall. In the static tests, the following type of walls were tested:

- 15/32-in. APA rated plywood sheathing on one side
- 7/16-in. APA rated OSB sheathing on one side
- 1/2-in. gypsum wallboard on both sides
- 7/16-in. APA rated OSB sheathing on one side and 1/2-in. gypsum wallboard on the other side.

Data from the tests included applied load and corresponding displacement at the top of the wall, uplift, and slip at the base of the wall. Figure 1 shows the static response of a 4 ft. x 8 ft. OSB wall assembly with a single panel on one side, parallel to framing. The panel was attached to the framing with No. 8 x 1 in. flat head sharp points screws. The screw schedule for this test was 4 in. on the perimeter and 12 in. in the field. The studs were all 3-1/2 in. deep (20 gauge).

The wall assemblies in the cyclic test program were all 4 ft. x 8 ft. with panels parallel to framing and either 15/32-in. APA rated plywood sheathing or 7/16-in. APA rated OSB sheathing attached to one side of the wall. Figure 2 shows the cyclic response of a wall sheathed with OSB. The OSB sheathing was attached to the framing with No.8 x 1 in. screws 4 in. center to center on the perimeter and 12 in. in the field.

Interpretation of the performance of the walls for wind and seismic design, in terms of nominal strength and serviceability requirements, is currently being pursued by AISI. Additional information on the test program and test results can be obtained by contacting the American Iron and Steel Institute, 1101 17th Street, N.W., Suite 1300, Washington, D.C. 20036-4700.

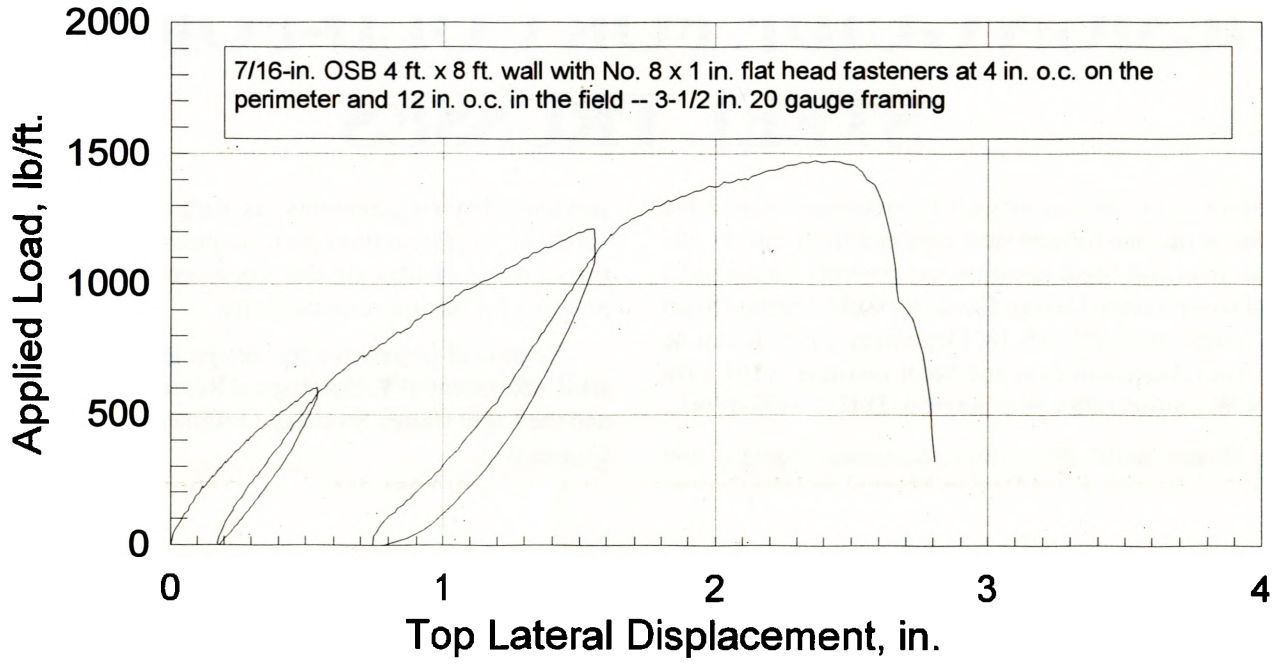

Figure 1

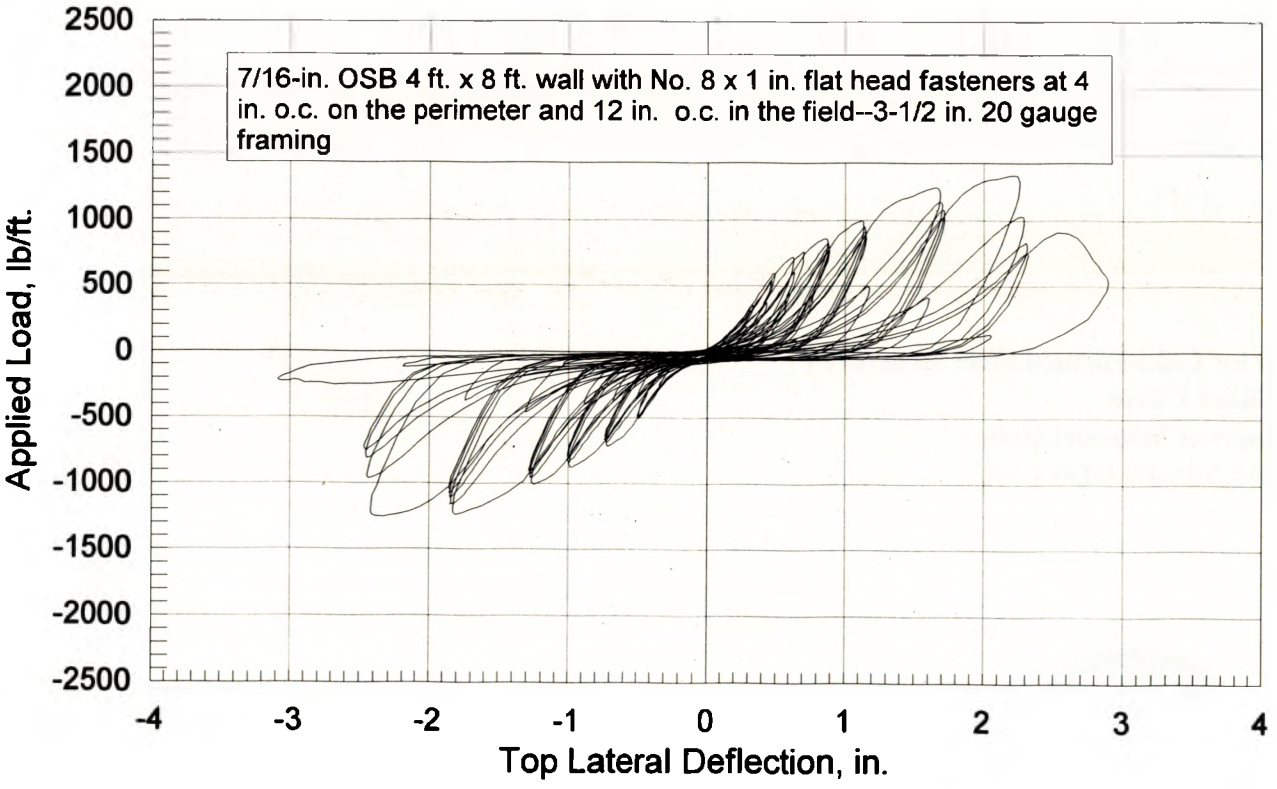

Figure 2

DESIGN GUIDE FOR COLD-FORMED STEEL TRUSSES

To assist in the design, as well as encourage innovative development of cold-formed steel roof and floor trusses, the American Iron and Steel Institute has recently published a technical report on the Design Guide for Cold-Formed Steel Trusses, publication RG-95-18, December 1995. It can be ordered from American Iron and Steel Institute, 1101 17th Street, N.W., Suite 1300, Washington, D.C. 20036-4700.

The design guide prescribes minimum strength and serviceability requirements, as well as a test protocol for verification of structural performance of a cold-formed steel truss. An appendix of the document addresses standard practice for design responsibility.

Technical review for the design guide was provided by AISI's Residential Technological Research Truss Task Group and the Light Gauge Structural Engineers Association Truss Committee.

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