Steel Interchange

Steel Interchange is an open forum for *Modern Steel Construction* readers to exchange useful and practical professional ideas and information on all phases of steel building and bridge construction. Opinions and suggestions are welcome on any subject covered in this magazine. If you have a question or problem that your fellow readers might help to solve, please forward it to *Modern Steel Construction*. At the same time feel free to respond to any of the questions that you have read here. Please send them to:

Steel Interchange
Modern Steel Construction
1 East Wacker Dr.
Suite 3100
Chicago, IL 60601

Answers and/or questions should be typewritten and double spaced. Submittals that have been prepared by word-processing are appreciated on computer diskette (either as a wordperfect file or in ASCII format).

The opinions expressed in *Steel Interchange* do not necessarily represent an official position of the American Institute of Steel Construction, Inc. It is recognized that the design of structures is within the scope and expertise of a competent licensed structural engineer, architect or other licensed professional for the application of principles to a particular structure.

Information on ordering AISC publications mentioned in this article can be obtained by calling AISC at 312/670-2400 ext. 433.

The following responses to questions from previous Steel Interchange columns have been received:

Where can one get information on stainless steel bolts?

Information on stainless steel bolts can be found in at least two very useful design documents:

1. *Specification for the Design of Cold-Formed Stainless Steel Structural Members* (ANSI/ASCE 8-90), American Society of Civil Engineers, New York, NY, 114 pages. (Stock No. 794) (Phone 800 548-ASCE)

This document, which is an update of the 1974 AISI specification, gives nominal (ultimate) shear and tension stresses for several types (alloys) and conditions (annealed, cold-worked, etc.) of stainless steel fasteners. Recommended resistance factors are also given, consistent with the LRFD format. Stresses apply to bolts less than, and equal to or greater than 1/2 in. diameter.

2. *Metal Curtain Wall Fasteners* (AAMA TIR-A9-1991), American Architectural Manufacturers Association, Palatine, IL, 47 pages. (Phone 708/202-1350)

This second document, which is based on allowable stress design, is devoted entirely to various types of fasteners (up to 1 in. diameter). In addition to background and design examples, this booklet presents tables of allowable shear and tension values for seven different "alloy group/condition" combinations of stainless steel fasteners in fourteen diameters (#6 up to 1 in.)

This booklet also reprints the abstract of ASTM F593 which gives the mechanical properties for seven alloy groups and seven conditions. In addition, a table cross references "type" (e.g. 304 alloy) to "group" (e.g. group one).

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What are some references that address the design of "curved" beams (supporting members rolled to a radius) frequently encountered at the perimeter of buildings, canopies, etc. as well as highway bridges and overpasses? Sources dealing with hot rolled (WF, C, L, etc.) sections are preferred, although any information regarding built-up members would also be appreciated.

I offer the following sources of information regarding built-up members:

1. *Guide to Stability Design Criteria for Metal Structures*, 4th Edition, Edited by Theodore V. Galambos, John Wiley & Sons, Inc., 1988.

2. *Guide Specifications for Horizontally Curved Highway Bridges*, Published by the American Association of State Highway and Transportation Officials, Washington D.C.

3. *Analysis and Design of Curved Steel Bridges*, Hiroshi Nakai and Chai Hong "Jay" Yoo, McGraw-Hill Book Co., 1988.

4. *Highway Structures Design Handbook*, AISC Marketing, Inc., Chapter 12-Horizontally Curved Girders, Pittsburgh, PA.

Additionally, please note that the Federal Highway Administration and the National Research Council of the Transportation Research Board are planning/undertaking research in the area of horizontally curved steel girders:

NCHRP 12-38, *Improved Design Specifications for Horizontally Curved steel Girders*, and

FHWA Contract DTFH61-92-C-00136, *Engineering Services for Curved Steel Bridge Research Project*.

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The AISC Specification Section A4.2 includes increases to live loads which induce impact. What is an appropriate increase for jib cranes?

The publication of the Department of the Navy, Naval Facilities Engineering Command, Alexandria, VA entitled *NAVFAC DM-38, Design Manual, Weight-Handling Equipment and Service Craft*, has an excellent source of equivalent static increases in shock-load and hook-load reactions for crane impact loads in Section 6, Part 1, Subsection 2.d. Table 1-10 shows percentages of increases for impact for a revolving structure as 35% for 25 tons or less, 30% for 26 to 50 tons, 25% for 51 to 80 tons, 20% for 81-120 tons, and 15% for 121 tons or more.

Trolley impact percentages run approximately +15% higher than those values shown in Table 1-10 for the given revolving structure increases.

It should be recognized that special application jib cranes, such as for the nuclear industry or for severe service, may require more specific design factors. Likewise, hoist manufacturers may recommend different impact factors for various line speeds and hoist line brake systems.

Dale H. Curtis, P.E.
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Are there limits on bending a wide flange beam into a radius?

The figures shown (right hand column) were published by US Steel Corp. many years ago and can be used as a guide.

Heinz Pak
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New Questions

Listed below are questions that we would like our readers to answer or discuss. If you have an answer or suggestion please send it to the Steel Interchange Editor. Questions and responses will be printed in future editions of Steel Interchange. Also, if you have a question or problem that readers might help solve, send these to the Steel Interchange Editor.

Is it permissible to weld nuts to bolts to prevent then from backing off? Are any special welding procedures required? Is the bolt/nut strength affected?

William C. Sherman, P.E.
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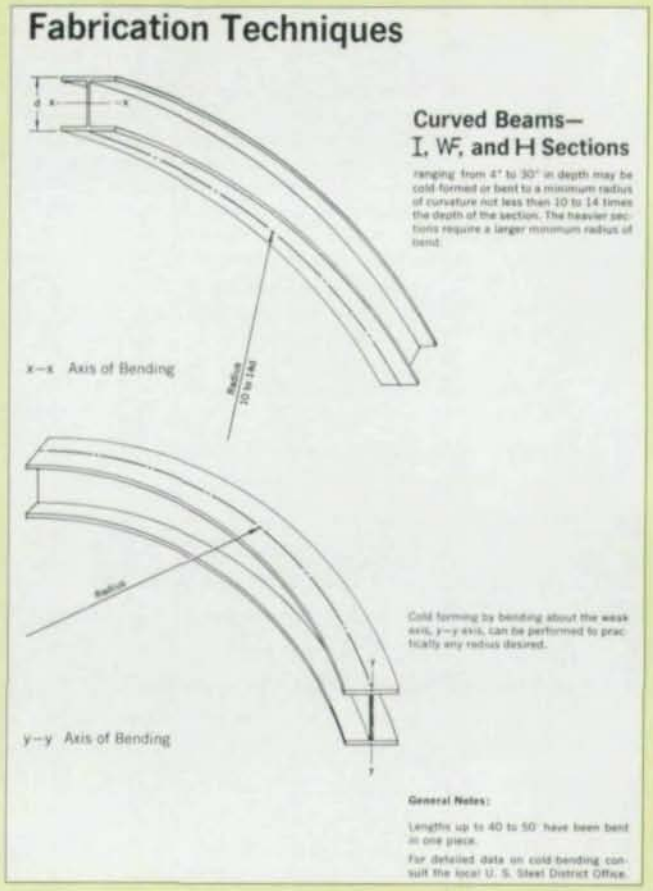

When designing a horizontal beam resting on columns with an unbraced compression top flange, may full-height web stiffeners at the bearing ends provide bracing to the compression flange without any intersecting beams (see detail below)?

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