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 you 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
One East Wacker Dr., Suite 3100
Chicago, IL 60601-2001

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).

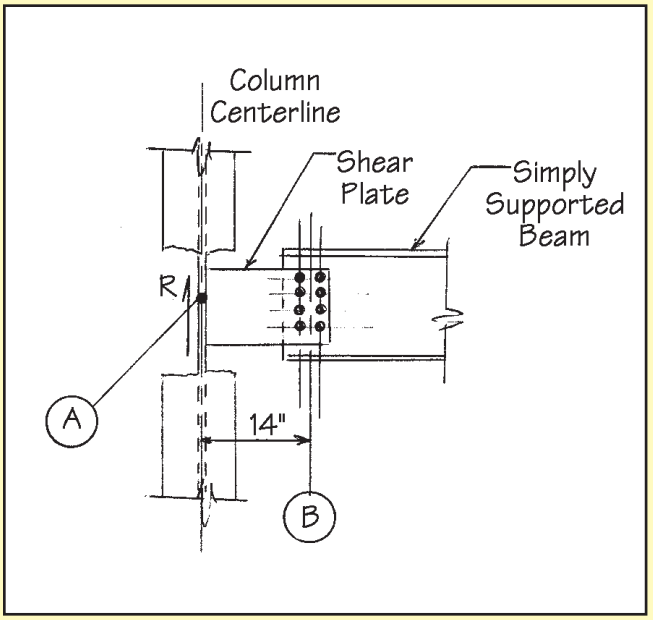
The opinions expressed in *Steel Interchange* do not necessarily represent an official position of the American Institute of Steel Construction, Inc. and have not been reviewed. It is recognized that the design of structures is within the scope and expertise of a competent licensed structural engineer,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

Information on ordering AISC publications mentioned in this article can be obtained by calling AISC at 800/644-2400.

*** * * * Questions and answers can now be e-mailed to: aiscpmn@interaccess.com * * * ***

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

If the bolts at the shear plate column connection for the simply supported beam shown in the accompanying sketch is designed to carry both shear and moment, can the connection at point A be assumed to transfer only shear to the column?



The connection shown is a poor one. The bolt group at B can be made strong enough so that the plate can be considered an extension of the beam web, but in so doing we transmit any rotation in the beam end (due to beam deflection) to the column web at A. The weld at A will be subject to shear and moment. The column web, shown unstiffened, may relieve some of the moment by slight controlled buckling. The remaining moment cannot accurately be determined. The weld at A must take this moment, whatever it is, into account. Regardless, when a plate has to "reach out: to make a connection it is subject to twisting - not a good situation. Both the top and bottom of the connection plate should be stiffened laterally and an effort made to laterally stabilize the beam end.

David T. Ricker, P.E.
Payson, AZ

When working on an old steel structure what precautions should be used before attempting to weld to this material?

We have received several requests from architects/engineers over the past several years asking us to determine the weldability of steel for older (circa 1900's) building rehabilitation projects. In such cases we recommend a chemical analysis (including a tramp element survey) of the material in question to determine, among other things, the carbon equivalent. This information is necessary for recommend a welding process, filler material and any special precautions (such as preheating, etc.) That would produce satisfactory welds.

An additional consideration is the prominent use of "rimmed" steels around the turn-of-the-century. To offset potential deleterious effects of impurity segregation, common in rimmed steels, we recommend the use of a joint design and welding procedure that minimizes dilution by the parent material. We normally recommend that proposed weld joint details and welding procedures be developed, qualified and certified in accordance with the requirements of AWS Structural Welding Code - Steel, D1.1. Welders should also be qualified to the developed procedure specification in accordance with AWS D1.1.

L. E. Smetana
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Editors note: the above subject, welding to old steel, is a complicated project. The AISC Engineering Journal *has other articles that cover welding and are also appropriate to review these papers. An article for the* Engineering Journal *is also being prepared which will cover this subject in detail.*

What storage requirements apply to high-strength bolts, nuts, and washers?

All fastener components must be stored in a manner that affords complete protection from moisture, heat, and dirt contamination. These precautions are necessary to avoid corrosion, loss of lubricant effectiveness, and dirt contamination that will increase both the installation torque and preload scatter range. Each day, upon removal from storage, each bucket of fasteners should be visually inspected for corrosion, lubricant condition, and dirt contamination; any fastener found to be corroded, lacking lubrication, or dirty is unacceptable for installation, but may be cleaned and relubricated with an approved lubricant.

Only the number of fasteners required for work to be done that day should be removed from storage. At the end of the work day, all fasteners not installed should be returned to storage.

Is it necessary to mill bearing surfaces after sawing?

LRFD Specification Section M2.6 states that "compression joints which depend on contact bearing... shall have the bearing surfaces of individually fabricated pieces prepared by milling, sawing, or other suitable means." AISC Code of Standard Practice Section 6.2.2 states that "any fabricating technique such as friction sawing, cold sawing, milling, etc. that produces a finished surface with maximum ANSI roughness height value of 500 may be used." State-of-the-art cold-sawing equipment produces cuts that are more than satisfactory in lieu of milling as generally specified by engineers.

What is the flatness tolerance for webs of welded plate girders?

Since for all statically loaded (building) structures, web flatness does not affect the structural integrity of a girder, neither the LRFD specification nor the AISC Code of Standard Practice provides a limitation on the maximum out-of-flatness of girder webs. AWS D1.1 Section 8.13.2 does, however, provide such requirements for welded plate girders. Problems arise, however, when these tolerances are applied to girders with thin webs. Specifically, in girder webs less than $^5/_{16}$-in. Thick, they do not account for operational difficulties caused by shrinkage resulting from web-to-flange welds and/or welds that attach stiffeners to the web. Because of this, in some cases, flatness within AWS tolerances cannot be practically provided.

AISC recommends that, for statically loaded (building) structures, the dimensional tolerance for deviation from flatness of a girder web less than $^5/_{16}$-in. Thick, without stiffeners or with stiffeners on one or both sides, be determined by the larger of ½-in. Or AWS D1.1 Section 8.13.2. If architectural considerations require special flatness tolerances, such special requirements must be identified on the engineering drawings and stipulated in the bid documents.

New Questions

Listed below are questions that we would like the readers to answer or discuss.

If you have an answer or suggestion please send it to the Steel Interchange Editor, Modern Steel Construction, One East Wacker Dr., Suite 3100, Chicago, IL 60601-2001 or e-mail it to: **aiscpmn@interaccess.com**.

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.

For tension applications such as anchor bolts and flange bolts, what are the pros and cons of using bolts with rolled threads versus cut threads?

John W. McCann
Hemphill Corporation
Tulsa, OK

Are there any special requirements needed when using splined end bolts as approved by the Research Council on Structural Connections in a painted structure where there is paint under the head of the bolt?

The AISC Code of Standard Practice Section 6.4.3 states: "Completed members should be free from twists, bends and open joints. Sharp kinks or bends are cause for rejection of material." What defines a sharp kink or bend in a member?

When designing a horizontally curved beam member for a building is there any reduction in design strength required due to the curve in the member? How are these beams designed?