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

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

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

AWS D1.1 includes a method of repairs for oversized holes to be used when exact dimensions are required for the holes.

In lieu of plugging the oversized hole why couldn't a sleeve or insert be put into the hole (to a snug-tight fit). The sleeve would take up the slack and when the bolts or connectors are connected to the member section, the section would compress.

Would this be an acceptable method versus plugging the oversized holes where correct size holes are required?

The realistic fact that a bolt is hardly ever exactly centered in an oversized hole should be enough to discourage the use of a sleeve because it would have to be made with an off-set hole which is machine shop work and costly. It would also be time-consuming as the customized sleeves probably could not be made up ahead of time.

Such a sleeve, barring other alternatives, could certainly be used on the inner ply of a connection. When used on an exterior ply the effect of the sleeve on the bearing surface of bolt washers should be assessed. In high-strength fully tensioned bolt applications the presence of the sleeve may adversely effect the magnitude of the bolt clamping power, for example, if the sleeve was made a hair thicker or thinner than the parent material. In all strength calculations the sleeved hole should be treated as an oversized hole.

Another thing to consider is the fact that a punched hole is actually conical in shape. The sleeve, even if carefully fitted, will bear only on the 'drag' portion of the hole, similar to the way a bearing bolt bears on the side of a normal hole. If this lack of full bearing presents a problem a sleeve probably should not be used.

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

What are the equations for the plastic (Z_e, Z_f) and torsional properties (J, C_w) of the built-up shapes, for instance a W shape or S shape, welded with channels or cover plates on one or both flanges; two or three shapes with or without lacing; castellated beams; etc.

Formulas for torsional constants can be found in a publication first published by Bethlehem Steel Corporation, Torsional Analysis of Steel Members, which is now published by AISC. (Order No. T114)

David S. Eliachar
Sausalito, CA
(Editor's Note: This publication is currently being re-worked as Design Guide #9: Torsional Analysis of Structural Steel Members, and will be available during the first quarter of 1997.)

What is the maximum eccentricity allowed for a crane runway rail and girder? (Centerline of rail to centerline of girder)

The Association of Iron and Steel Engineers Technical Report No. 13, section 5.18.6.4 states:

"Crane rails shall be centered on the crane girder web whenever possible. In no case shall the rail eccentricity be greater than three-fourths of the girder web thickness."
The Guide for the Design and Construction of Mill Buildings is the most definitive resource of its kind, and is an ideal resource for crane buildings of all types.

*James R. Thomas*
Delich, Roth & Goodwillie, P.A.
Kansas City, MO

**What is the maximum eccentricity allowed for a crane runway rail and girder? (Centerline of rail to centerline of girder)**

The AISE Technical report No. 13 states: “Crane rails shall be centered on the crane girder web whenever possible. In no case shall the rail eccentricity be greater than three-fourths of the girder web thickness.”

This tolerance may be very difficult to achieve on certain long-span, light-capacity crane runways. It should be understood that the AISE Technical Report No. 13 was written to include high duty-cycle crane runways where welded girders are often used. For older, existing runways, engineering judgement should take into consideration the duty-class of the runway before undertaking an expensive alignment project.

*Gary J. Davis, P.E.*
P&H Harnischfeger Corporation

**What is the maximum eccentricity allowed for a crane runway rail and girder? (Centerline of rail to centerline of girder)**

The oft-quoted reference AISE Technical Report No. 13 suggests the limit for this eccentricity be 0.75 x web thickness. This applies to both wide flange beams and plate girders.

Most bolted rail clamps will keep the rail well within this limit if properly made. Hook bolts (J-bolts), however, can be tightened so as to pull the rail beyond this limit and care must be exercised in their installation.

Additional information on crane runways may be gleaned from Vol. 19, No. 4, of the AISC Engineering Journal, 1982, “Tips for Avoiding Crane Runway Problems.”

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

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**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. Questions can also be sent via e-mail to ais-cpmn@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.

What is acceptable practice for determining the load capacity for a lifting beam, similar to that shown in the accompanying sketch, for which there is no lateral support? Is it appropriate to use the full beam length to determine the bending strength of the member? Is doing so overly conservative? Are there design considerations other than strong axis bending capacity?

*Robert M. Eshbach, P.E.*
Entech Engineering
Reading PA

Will problems occur if you hot dip galvanize 135 pound crane rail (ASTM A759)? Would you have problems with distortion, strength, alignment, etc.

*Paul Quiel*
United Design & Engineering
Bloomfield, IN