

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**

**** Questions and answers can now be e-mailed to: rokach@aiscmail.com ****

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

(From the July 1998 issue)

During bridge repair, rivets are often removed and replaced with A325 or A490 bolts. Is there a standard procedure written for the removal of rivets and re-sizing of the fastener hole? If the base metal is going to be re-used, I would think that it would be very important not to damage or overheat the base metal around the fastener hole. This base metal could be a multiple build-up of two, three or four-plys. Should these rivets be removed with a machine or cutting torch? Rivets are pressed in when newly installed, should they be pressed out? What preparation should be taken to remove and rework a riveted connection?

The typical rivet removal procedure involves two steps: first the head is removed (at one end) using a pneumatic hammer with a chisel tip (known as a "hell dog"); after the head is removed, the chisel is replaced with a flat punch and the rivet is pushed out. Safety is extremely important, particularly if working over traffic or in a crowded area. You should have someone catch the heads and shanks as they are removed. In the unlikely event that the rivet cannot be punched out of the hole, it should be removed by drilling. I've been on projects where the specifications allowed flame cutting of the heads and others where it was prohibited. I don't like flame cutting, except as a last resort, because the integrity of the base metal is dependent upon the skill of the operator. As far as reworking a riveted connection, it's no different from the usual fit-up and bolting procedure.

***jbm123@sunlink
via email***

Another answer:

Rivets can be easily removed by "washing" one head off with an acetylene torch. Next, a hole is

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 Word 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 principles to a particular structure.

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burned along the rivet longitudinal axis. Then, while still hot, the rivet can be driven out with a pin punch and a two-pound hammer. This process completely removes the rivet and leaves a clean hole in original condition. We have successfully employed this method on several building projects and on Amtrak's Susquehanna River bridge.

***Michael J. Walkley, P.E.
Michael J. Walkley, P.A.
Baltimore***

Still another answer:

The rivet question was actually four questions and can be summarized as follows:

1. *Is there a written procedure for rivet removal and hole rehabilitation.* No.
2. *Should rivets be removed by mechanical means or by torch?* Both methods are commonly and successfully used. Mechanically extracted rivets will usually cause less damage to the base metal. This may be a factor in bridge rehabilitation where constant vibrations will accelerate fatigue failure. Most building structures experience static loading. Burning off rivet heads and "coring" the shanks are common methods of removing rivets. If done carefully, no damage to the base metal results.
3. *Should rivets be pressed out?* Yes, there is no other way. If the original rivet was installed in a hole where the plies were not perfectly aligned, the hot rivet assumed the shape of the crank shaft. These are difficult to remove and "coring" the shank will ease the task.
4. *What preparation should be taken to remove and rework a riveted connection?* When removing the rivet head, either by chisel or torch, care must be taken not to gouge the base metal beneath the head to the extent that it would prevent proper seating of the subsequently installed high-strength bolt. Misalignment of plies can be treated with a reamer.

To summarize: Whether to use a mechanical means or a torch to extract rivets depends mainly on the use to which the structure is subjected. This should be addressed in the project documents.

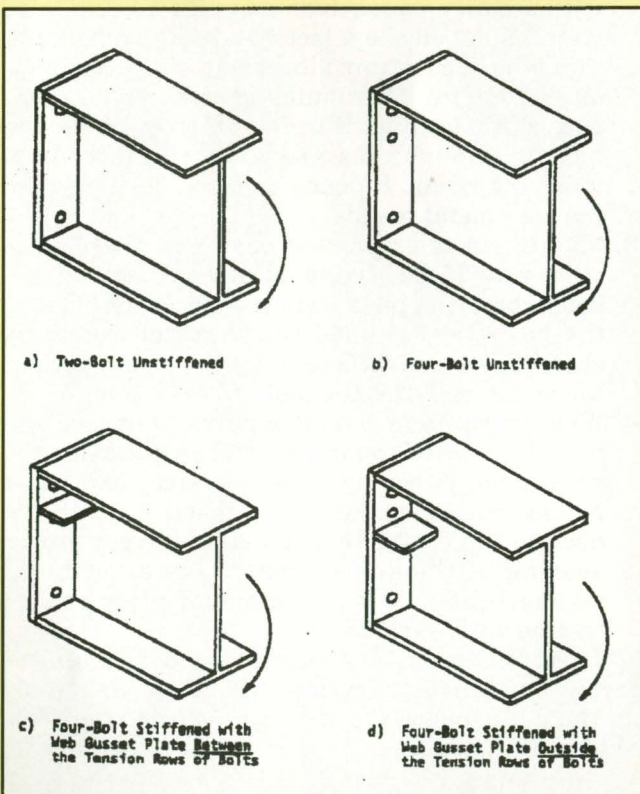
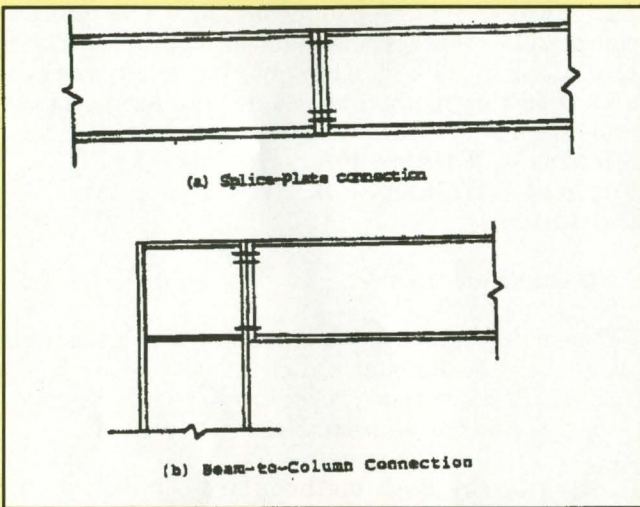
STEEL INTERCHANGE

Burned holes have been the subject of much unsubstantiated concern in recent years despite evidence to the contrary. (For more information, see "Effect of Hole-Making on the Strength of Double Lap Joints," by T.J. Schlafly and N.R. Iwankiw in the *AISC Engineering Journal*, Third Quarter, 1982.)

David T. Ricker
Consulting Engineer
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(From the December 1987 issue)

I've come across the end-plate connections shown in the figures several times. Are they all semi-rigid moment connections or are they semi-rigid connections?



These connections can be either rigid or semi-rigid depending on the design load and how the connection is designed. If the design moment is substantially less than the full section capacity as is typically the case in the continuous beam splice shown, the designer can select plates and bolts that will function as rigid connections. If the design moment is close to the full section capacity, as is the case in the beam-to-column connection in a rigid frame, it may be necessary to design the connection as a semi-rigid frame and size the frame members accordingly.

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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 rokach@aiscmail.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.

I have two questions:

1. Is there a repair code for steel beams? If so, can you give me a source?
2. Our company is in the underground support industry (mines, tunnels, shafts, etc.). It has been common practice for many years to make bolt holes $\frac{1}{8}$ " larger than the bolt to be used (A325). This is because the excavations are taking place under adverse conditions and the steel erectors have to place the supports as fast as possible. Does this mean the holes are oversized and require washers? The workers just do not have time to place the washers.

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