STEEL QUIZ

STEEL QUIZ, A MONTHLY FEATURE IN *MODERN STEEL CONSTRUCTION*, allows you to test your knowledge of steel design and construction.Unless otherwise noted, all answers can be found in the *LRFD Manual of Steel Construction*. **To receive a free catalog of AISC publications, circle #10 on the reader service card in the back of this magazine.**

Send Steel Quiz Questions & Answers to Charlie Carter, AISC, One East Wacker Dr., Suite 3100, Chicago, IL 60601-2001; fax: 312/670-5403.
To receive a copy of the 1997 AISC Publications List, please call 800/644-2400 or fax 312/670-5403.

QUESTIONS

1. Can the panel zone of an ASTM A572 Grade 50 column be reinforced with an ASTM A36 web doubler plate?

2. Was the fillet weld shown below deposited from **A** to **B** or from **B** to **A**?

3. Wind forces on exposed hollow structural section (HSS) frameworks are lower than wind forces on dimensionally similar exposed W-shape frameworks, True or False?

4. The basic wind speeds in ASCE 7-95 are higher than those in ASCE 7-93. What effect does this have on the resulting design wind pressures?

5. The AISC LRFD Manual indicates that non-galvanized ASTM A325 bolts are suitable for reuse if the nut can be run down the threads to the thread runout by hand. Why?

6. An existing non-composite beam is strengthened by coring holes through the floor slab, installing shear stud connectors, and grouting the holes. Which of the following statements is not true?

(a) a non-shrink (shrink-compensating) grout with strength that is at least equal to that of the floor slab should be used.
(b) the cored holes need only be sized to permit access to install the shear stud connectors.
(c) the initial load on the steel beam and the subsequent load on the composite cross-section must be superimposed to determine the flexural strength.
(d) none of the above.

7. What is Scott Melnick's e-mail address at AISC?

8. Second-order effects are covered in AISC LRFD Specification Chapter C, including a simplified method with the factors B_1 and B_2. What second-order effect does each of these factors address?

9. Give two examples <u>each</u> of common structural shapes that have: (a) only unstiffened elements; (b) both unstiffened and stiffened elements; and, (c) only stiffened elements.

10. Double-angle simple-shear connections accommodate beam end rotation through flexing of the outstanding legs, which is permitted to occur into the inelastic range in AISC LRFD Specification Section J1.2 because it is self-limiting deformation. Why is this deformation self limiting?

ANSWERS

1. Only if the reinforced panel zone is designed assuming that both the column web and web doubler plate have a yield strength of 36 ksi. Otherwise, the web doubler plate would shear before the strength of the column web is obtained because shear deformations of both elements will be similar.

2. It was deposited from B to A. The molten weld metal cools faster at the toes because the base metal draws heat away. The ripple pattern results when the slower-cooling weld metal is drawn back by surface tension as the weld is deposited.

3. True. Round HSS and rectangular HSS with rounded corners generally offer less resistance to external fluid flow than W-shapes of similar dimension. Accordingly, a wind-force reduction factor has been incorporated into the forthcoming AISC *Specification for the Design of Hollow Structural Sections*. For round HSS, a one-third reduction in wind force is specified. For rectangular HSS, the reduction varies from none to one-third.

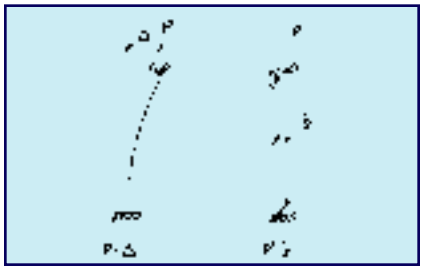
4. Largely none. This change in ASCE 7 was made because the method of measurement for wind speed data has changed. The resulting design wind pressures, however, remain unchanged in the majority of cases.

5. When bolts are fully tensioned, the threaded length between the nut and the thread runout is plastically elongated. Such a fastener is suitable for reuse if this elongation has neither compromised the fit-up between the bolt threads and nut threads nor exhausted the ductility of the bolt. As a practical rule-of-thumb, threads can be said to match and sufficient ductility will remain if the nut can be run down the bolt shank to the thread runout by hand.

6. c. Because composite-beam limit-states occur in the inelastic range, the ultimate strength of the composite cross-section is not influenced by the presence of initial load.

7. Scott's e-mail address is melnick@aiscmail.com This pattern is consistent for all AISC employees: <last name>@aiscmail.com. Hence, schlafly@aiscmail.com, newman@aiscmail.com, cattan@aiscmail.com, and so on.

8. B_1 addresses member curvature as illustrated for P-δ below. B_2 addresses relative displacement between the column ends as illustrated for P-Δ below.



9. Angles and tees have only unstiffened elements; I-shapes and channels have both unstiffened and stiffened elements; and round and rectangular HSS have only stiffened elements.

10. Because the outstanding angle legs can only flex as far as the simple beam rotation will allow. At that point, the beam itself resists further rotation of the connection angles.