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 copy of the 1997 AISC Publications List, please call 800/644-2400 or fax 312/670-5403.**

QUESTIONS:

1. Where can one find information on U.S. metric shapes?

2. As produced, structural shapes are required to conform to standard mill practice. What is this?

3. A stick-out of two threads beyond the face of the nut is required for a properly installed bolt, True or False?

4. When a bolted joint is to be fully tensioned, the snug-tight condition is the starting point when methods such as turn-of-nut and calibrated wrench installation are used, True or False?

5. Why is the weld deposition rate faster in the horizontal and flat positions than in the vertical or overhead positions?

6. A common rule of thumb states that it is more economical to have a smaller-size, longer fillet weld than a larger-size, shorter fillet weld. Why?

7. A bolted joint subject to combined shear and tension has been specified as slip-critical and is subject to prying action. Should the calculated slip resistance of the joint be reduced for the additional tension present due to prying action?

8. In column design, for what is the stiffness reduction factor used?

9. In a partially composite beam, which of the following controls the flexural design?
   a) compression in the concrete
   b) tension in the steel
   c) compression in the steel
   d) shear strength of the shear stud connectors

10. In which of the following trusses is a moment connection required between the web members and chord members?
    a) Pratt
    b) Fink
    c) Warren
    d) Vierendeel

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ANSWERS:

1. Metric properties and dimensions can be found in AISC's *Metric Properties of Structural Shapes* (Pub. No. S340). Because the U.S. customary shape series is one of the most efficient in the world, and because the inch-series dimensions are nominal (i.e., a W14 is not exactly 14 in. deep), the metric series is simply a soft conversion of it.

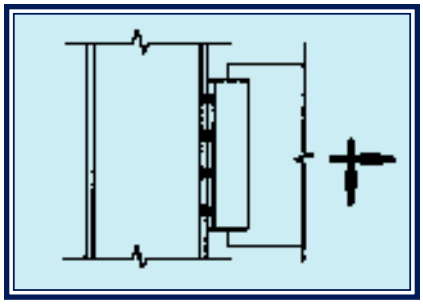
2. Standard mill practice describes the cross-sectional and overall tolerances that are acceptable for rolled shapes. These tolerances are specified in ASTM A6/A6M, which is summarized in Part 1 of AISC's *Manual of Steel Construction*.

3. False. RCSC Specification Commentary Section C2 defines full thread engagement as "having the end [point] of the bolt at least flush with the face of the nut."

4. True, essentially. The desired clamping force in a fully tensioned bolted joint is obtained by elongating the shank of the bolt during installation. Meaningful elongation only occurs if the connected plies are first brought into firm contact, which is essentially the definition of a snug-tight bolted joint.

5. In the flat and horizontal positions, the work cradles the molten weld pool as it cools. In the vertical and overhead positions, however, gravity fights surface tension to displace the molten weld metal, thereby limiting the amount of weld metal that can be deposited.

6. Fillet weld cost is nominally proportional to the weld metal volume required. In turn, weld metal volume is proportional to the square of the weld size and the weld length (to the first power). Thus, fillet weld cost increases with weld size faster than with weld length.



7. No. Any loss of slip resistance due to prying tension in one sector of the joint is compensated for by an equivalent increase in slip resistance due to prying compression in the other.
8. The stiffness reduction factor (SRF) is used to adjust the value of G that is used in the alignment charts to determine K when column behavior is in the inelastic range.

9. d.

10. d. Pratt, Warren and Fink trusses all have the traditional truss arrangement, which uses triangulation to resist forces predominantly through the axial strength of the truss members. In contrast, the Vierendeel truss has no diagonals and must resist forces predominantly through the shear and flexural strength of the truss members.

Point Park College Pedestrian Walkway in Pittsburgh is a good example of a Vierendeel truss.