1. ASTM A6/A6M covers the metric series of structural shapes that is in use in the United States. Because it is a soft metric conversion, the metric series is physically identical to the inch-pound-unit shape series. The dimensions are given in millimeters, with the mass expressed in kilograms; note that the mass must be multiplied by acceleration of gravity 9.81 m/s² to obtain kilonewtons (KN). Please see FAQ 1.3.3 for more on this topic at www.aisc.org/faq.

2. Yes. The 2005 AISC Specification Section M2.1 and a discussion in the 13th edition AISC Manual (part 2), provide a sound basis for the use of controlled heat to straighten, curve, camber, and form structural steel. Moreover, Section 5.26.2 of the 2006 AWS D1.1 permits heat-straightening of members that are distorted by welding and stipulates rules for this procedure.

3. Yes, although the gap size is limited. As per the 2005 AISC Specification section M4.4, “Lack of contact bearing not exceeding a gap of \( \frac{1}{16} \) in., regardless of the type of splice used, is permitted.” If the gap exceeds \( \frac{1}{16} \) in., but is less than \( \frac{1}{4} \) in., and an engineering investigation shows that the actual area in contact (within \( \frac{1}{16} \) in.) is adequate to transfer the load, the gap is acceptable.

4. Some examples of when notch toughness may be specified by the engineer include applications with dynamic or impact loading, fatigue loading, low service temperature, and some welded joints in heavy shapes/plates and CJP groove welds in high-seismic applications. See FAQ 4.4.1 for an explanation of why toughness is required in general.

5. No. However identical these materials are in terms of mechanical properties, they differ in that ASTM A325 and A490 specify thread length and head size, whereas SAE J429 does not. Moreover, quality assurance and inspection requirements for ASTM A325 and A490 bolts are more stringent.

6. Plug and slot welds are permitted for the transfer of shear force only. As such, they are sometimes used to transmit shear in lap joints, to join components of built-up members, or to prevent buckling of lapped parts. Their design and usage is covered in Section J2.3 of the 2005 AISC Specification.

7. Yes. AISC Design Guide 19 provides detailed information on rated assemblies and many other aspects of the fire protection for steel buildings.

8. An intumescent coating is one that chars, foams, and expands when heated. This way it is able to provide insulation for the steel from high temperature in a fire. Please see FAQ 11.1.6 and AISC Design Guide 19 for more details on this.

9. The rapid expansion of hot gases resulting from the detonation of an explosive charge gives rise to a compression wave called a shock wave, which propagates through the air. The time required for compression of the undisturbed air just ahead of the wave to full pressure just behind the wave is essentially zero. See FAQ 12.1.2 for more on peak pressures and its phases.

10. Progressive collapse is the propagation, by chain-reaction, of a local structural failure into the failure of a substantial portion of the building, disproportionate in magnitude to the original failure.

This month’s Steel Quiz was developed by AISC’s Steel Solutions Center. Sharpen your pencils and go!