

steel quiz

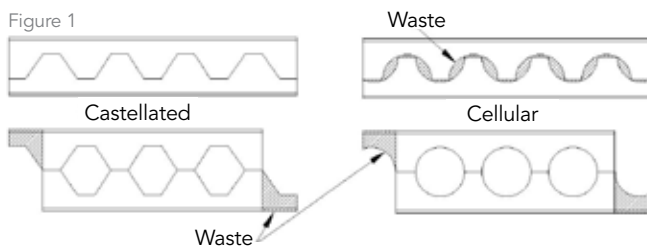
This month's Steel Quiz is based on AISC Design Guide 31: *Castellated and Cellular Beam Design*. AISC members can download all AISC design guides for free and nonmembers can purchase them at www.aisc.org/dg.

- 1 The Beams with expanded web sections and repeating web openings were first used in:
a. 1910 b. 1923
c. 1954 d. 1971
- 2 **True or False:** When two cut sections are welded back together to form the castellated section, a fillet weld is used to connect the two webs together.
- 3 **True or False:** The time to produce a cellular beam is slightly greater than that of a castellated beam.
- 4 During manufacturing, a castellated beam has _____ material waste when compared to the material waste resulting from the manufacture of cellular beams:
a. more b. the same
c. less d. zero
- 5 **True or False:** A CB designation stands for "cellular beam."
- 6 The halves of a W21×44 and a W21×57 are used to form which of the following castellated beam sizes:
a. CB21×50.5
b. CB42×50.5
c. CB30×44/57
d. CB21×44/57
- 7 In general, castellated and cellular beams are very economical alternatives for spans greater than:
a. 30 ft b. 40 ft
c. 50 ft d. 60 ft
- 8 **True or False:** An asymmetric castellated or cellular beam section usually consists of a smaller top tee and a larger bottom tee.
- 9 **True or False:** There are no UL fire-rated assemblies for use with castellated and cellular beams.
- 10 **True or False:** Provisions for determining the lateral-torsional buckling strength of solid wide-flange beams can be used for castellated and cellular beams if the cross-sectional properties are calculated at the gross section of the beam.

NEXT PAGE FOR ANSWERS

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- 1 **a.** 1910. These beams were first used in 1910 by Chicago Bridge and Iron Works.
- 2 **False.** A full- or partial-penetration butt weld is used and is typically made from one side of the web, without prior beveling of the edges if the web thickness is relatively small.
- 3 **True.** In order to achieve the circular pattern, two cutting passes are needed, which increases the handling of the steel during fabrication.
- 4 **c.** Less material waste. Figure 1 illustrates the material waste for both castellated and cellular beams.
- 5 **False.** CB stands for castellated beam. LB stands for cellular beam.
- 6 **c.** CB30x44/57. The first number provides the approximate depth and the second pair of numbers indicates the nominal weight of the root beam used for the top and bottom of the castellated beams. The weight of the castellated beam would be equal to average of the two weights, which is equal to 50.5 lb/ft.
- 7 **b.** 40 ft. Castellated and cellular beams are practical for spans greater than 30 ft, but economy improves at longer span lengths.



- 8 **True.** Asymmetric sections are usually advantageous for composite applications where the top tee works in conjunction with the concrete slab.
- 9 **False.** There are three UL fire-rated assemblies. UL assemblies N784 and N831 are for a slab-on-deck system, and UL P225 is for use in roof assemblies.
- 10 **True.** Failure of castellated beams by lateral-torsional buckling is similar to that of solid wide-flange beams, with the holes having little influence.

Anyone is welcome to submit questions and answers for the Steel Quiz. If you are interested in submitting one question or an entire quiz, contact AISC's Steel Solutions Center at 866.ASK.AISC or solutions@aisc.org.



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