



## ***Glulam Beams Sized for Narrower Hangers***

### 1. Introduction

Structural glued laminated timber (glulam) beams are typically manufactured to standard widths, such as 3-1/8, 3-1/2, 5-1/8, and 5-1/2 inches. Most prefabricated metal hangers are designed to fit these standard glulam widths. Occasionally, the 3-1/2 and 5-1/2-inch wide glulam beams may be required for installation with slightly narrower hangers designed for a 3-1/8 and 5-1/8-inch wide glulam beam.

When the 3-1/2 and 5-1/2-inch wide glulam beams are installed with slightly narrower hangers, the contractor often notches the beam width for about 3/16 inch on each side of the beam at the bearing location to the net width of approximately 3-1/8 and 5-1/8 inches, respectively, so as to fit the glulam into the hanger. A question has been raised as to the effect of the side notches on the glulam beam performance.

### 2. Analysis

Most glulam manufacturers do not recommend notching glulam beams at critical locations, such as at the bottom of the beam (i.e., the tension lamination). See APA Technical Note S560, *Field Notching and Drilling for Glued laminated timber Beams*, for more information. From a timber engineering perspective, when a simply-supported glulam beam of 3-1/2 and 5-1/2 inches in width subjected to uniform loads is sized for slightly narrower hangers, the shear and bearing (compression perpendicular-to-grain) capacities of the glulam may be reduced proportionally to the beam width,  $(3-1/2 - 3-1/8) / 3-1/2 = 11\%$  and  $(5-1/2 - 5-1/8) / 5-1/2 = 7\%$  for a 3-1/2 and 5-1/2-inch wide beam, respectively. The bending capacity of the glulam, which depends on the lamination quality, would be likely affected by the side notches that could lower the lamination quality. However, the bending capacity of the simply-supported glulam beam is generally not a concern because the applied moment at the bearing location is negligible. For other more complicated loading conditions, an engineering analysis may be required.

In some cases, the 3-1/2 and 5-1/2-inch wide glulam beams may be designed by conservatively assuming a beam width of 3-1/8 and 5-1/8 inches. This could occur, for example, when a load-span table based on the 3-1/8 or 5-1/8-inch beam width is used in design of a 3-1/2 or 5-1/2-inch wide glulam beam. In this case, the glulam beam should be adequate in structural performance. Note that the glulam side notches should be carefully prepared to avoid over-cutting or jamming into the hanger.

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