



Technical Q & A

Chunk-Out Design Errors

by Rachel Smith

If you're in the process of switching to ANSI/TPI 1-2002, "chunk-out" errors may be a new wrinkle in your floor truss designs. Read more about how to handle these errors.

We receive questions on new provisions of the ANSI/TPI 1-2002 National Design Standard for Metal Plate Connected Wood Truss Construction as more and more truss manufacturers are switching from the ANSI/TPI 1-1995 version. The following question relates to a new provision in Section 8.9.2 that applies to trusses with plating on the narrow face of lumber like floor trusses.

Question

Could you explain what a "chunk-out" error means in our software when we have a truss that does not run for long spans?

Answer

The chunk-out provision in design software is meant to address a potential design failure where high tension members can tear out the wood at the edge of the teeth along the grain of the wood. You can think about this as very similar to what happens when you split a piece of wood with an ax and it separates along the grain. (See photo.) Generally, changing lumber species or grade won't help; it's based on the size of the member underneath the truss plate and the amount of axial force.

Stu Lewis, Research & Development Manager at Alpine Engineered Products explains, "This limitation was to account for interaction of stress concentrations due to the teeth on a truss plate only penetrating about 1/3-inch into the lumber and stress concentrations due to wood defects near the plate. This was found through experience to result in low tensile capacities of lumber even when the wood defect was not under the plate, so it is not something that can be readily solved by increasing plate length."

Section 8.9.2 of TPI 1-2002 states:

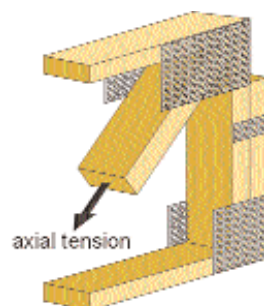
For wood thickness greater than 2 inches with plates embedded only on the surface normal to the thickness, the tension, T , introduced by a single joint into a wood member, shall not exceed 1600 pounds per inch of wood width, where wood thickness is the wood cross-section dimension perpendicular to the plane of the truss and wood width is the wood cross-section dimension in the plane of the truss, and this tension limit shall be adjusted per Section 6.4.



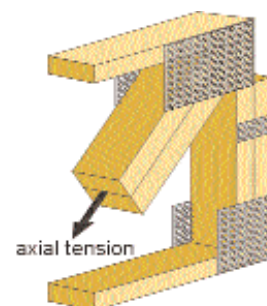
Photo of test joint after chunk-out failure in web.

at a glance

- ❑ ANSI/TPI 1-2002 has several new provisions that you will need to get used to as you change over from the 1995 version.
- ❑ Some floor truss designs created with 1995 provisions may develop "chunk-out" errors when they are re-analyzed with ANSI/TPI 1-2002.
- ❑ Doubling the particular web or chord in that section will solve the problem.



Single webs or chords:
max. axial tension = 2400 lb



Double webs or chords:
max. axial tension = 4800 lb

The TPI 1-2002 commentary further states:

The 1600 lb/in limit specified in Section 8.9.2 was added to the 2002 edition of the Standard to check against a wood “chunk-out” failure at tension joints, which testing has shown to be a failure mode that can occur, particularly with narrow-face plating. Test data from applications with plates on the narrow faces of 2x4 lumber has shown that the relatively high stress concentrations in the outermost portion of the narrow lumber faces where the teeth penetrate can result in premature wood fracture when a knot or other grain deviation occurs near the plate. Based on this empirical limit, the maximum normal duration tension load is 2400 lb for a 4x2 or 3x2, and 4800 lb for two 4x2s or two 3x2s.

As far as what you can do about it, Gary Obudzinski, a senior engineer at Truswal Systems Corporation says, “Chunk-out is based on the member force, and if the member force (web or chord) is slightly over the allowable load of 2,400 lbs for a 4x2 web member, for example, we will try to move a panel point and lower the force to be less than 2,400 lbs. If this does not work, our suggestion is to increase the member stack (i.e., add another web or two) until it works. For example, two 2x4s are good for 4,800 lbs. If a chord has chunk-out failure, we suggest doubling the chord in that panel.”

Scott Coffman, a Builder’s First Source engineer, reports that he and his designers most often see the chunk-out error on longer cantilevers, typically 24" long, with a large point load at the end. His solution is to double the top chord in the cantilever with the stacked section extending into the back span twice the cantilever distance.

The chunk-out error message may be new for those switching to TPI 1-2002, but most design software was already making a similar check on webs and doubling those up when necessary. The difference now is that webs and chords are subject to the same check. **SBC**

To pose a question for this column, call the WTCA technical department at 608/274-4849 or email technicalqa@sbcmag.info. For more frequently-asked technical questions and answers, visit the Education & Technical section of the WTCA web site at www.woodtruss.com. More answers are only a click away!



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