

by Ryan J. Dexter, P.E.

**SBCA and TPI resources for attaching multiple-ply girders**

The Building Component Safety Information (BCSI) booklet<sup>1</sup> defines a girder truss as a truss designed to carry heavy loads from other structural members framing into it. Sometimes girder trusses are single ply, but they are more typically multiple-ply trusses because of the magnitude of the load they need to carry. A multi-ply truss is designed to be installed as an assembly of two or more individual trusses fastened together to act as one. It should be noted that the code-referenced standard ANSI/TPI 1-2007 *National Design Standard for Metal Plate Connected Wood Truss Construction*<sup>2</sup> developed by the Truss Plate Institute provides a limit to the number of plies a multi-ply truss can have:

**TPI 1-07 Section 7.5.2.4 Maximum Plies.**

The maximum number of plies shall be five, if the structural members imposing a load are attached to one side of the girder, or six, if the structural members imposing a load are attached to both sides of the girder.

The specific ply-to-ply connections of multi-ply trusses are specified on the truss design drawings. Depending on your market, the trusses are delivered to the jobsite pre-fastened by the component manufacturer or delivered singularly and the fastening is done by the contractor at the jobsite. The following is a question we recently received from a component manufacturer looking to begin pre-fastening roof multi-ply girder trusses.

**Question**

*Do you have any information on assembling multi-ply truss girders together in a manufacturing facility? We are looking to put together a training program for attaching plies and was wondering what resources are out there on properly fastening multi-ply girders together.*

**Answer**

There are a few sources of information on assembling multi-ply truss girders together regardless of whether it is in a manufacturing facility or at the jobsite.

ANSI/TPI 1-2007 Section 7.5.5 provides the following requirements:

**TPI 1-07 Section 7.5.5 Ply-to-Ply Connections.**

**7.5.5.1 Connection of Members.** Girders with up to three plies shall be connected by nailing, bolting, or other approved fasteners in accordance with an approved design criteria. Girders with four or more plies, and having structural members imposing a load on one side of the girder, shall be connected by bolting, a combination of nailing and bolting, or by other approved fasteners. Either nails, bolts, or other approved fasteners shall be designed to transmit 100 percent of the imposed load from one side; the values for more than one type of approved fastener in the same connection shall not be combined. Webs in girders of any number of plies shall be permitted to be joined with nails.

**7.5.5.2 Design Load.** Connections shall be designed to transmit load from ply to ply in accordance with the ply-to-ply load distribution assumed in the design of the girder. Connections shall be adequate to carry the cumulative load of the remaining plies.

**7.5.5.3 Design for Withdrawal Load.** Connections between the individual plies of a

member shall be designed for withdrawal loads equal to two percent of the axial compression force in each ply so connected, for each unbraced length of the member, or these connections shall comply with the provisions of the ANSI/AF&PA NDS for use of  $K_f$  when used per Section 7.3.2. For the purposes of this section, for members braced by sheathing, the unbraced length over which the fasteners carrying this withdrawal load are distributed shall be permitted to be 10 times the cross-section dimension parallel to the dimension in which the sheathing prevents buckling.

**7.5.5.4 Nail Spacing.** Nail spacing shall be the smaller of the two determined from Sections 7.5.5.2 and 7.5.5.3, but in no case shall the spacing exceed 12 in. on center. Nailing patterns shall be specified on the Truss Design Drawing.

**7.5.5.5 Bolt Spacing.** Bolt spacing shall be the smaller of the two determined from Sections 7.5.5.2 and 7.5.5.3, but in no case shall the spacing exceed 24 in. on center unless the bolts are used solely for reasons other than to carry loads addressed by Sections 7.5.5.2 and 7.5.5.3. Bolts shall have a diameter no less than 1/2 in. and no greater than 1 in.

In 7.5.5.1, proprietary screws are an example of common "other approved fasteners." If you are using proprietary screws, the screw manufacturer has recommendations in their catalog on how to fasten plies together and also on any related fastening needs. Typically, they allow the connections to occur from one side, eliminating the need to flip the truss to fasten the opposite side. In other words, the plies can be stacked and then fastened from one side.

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Lastly, the BCSI B9 Summary Sheet explains how to determine the proper number of plies, attachment methods, types of fasteners and standards of fastener installation. It is a good summary of the multi-ply girder information commonly available for the market. **SBC**

*To pose a question for this column, call the SBCA technical department at 608/274-4849 or email [technicalqa@sbcmag.info](mailto:technicalqa@sbcmag.info).*



The BCSI B9 Summary Sheet is a good summary of the multi-ply girder information commonly available for the market.

**at a glance**

- Multiple-ply truss girders can be assembled in manufacturing facilities or at the jobsite.
- Specific ply-to-ply connections of multi-ply trusses are specified on truss design drawings.
- TPI 1-2007 defines multi-ply girder assembly requirements in section 7.5.5.1.
- Proprietary screw manufacturers will have recommendations on how to fasten plies together.



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<sup>1</sup> [www.sbcindustry.com/bcsi.php](http://www.sbcindustry.com/bcsi.php)

<sup>2</sup> [www.tpinst.org/publication-tpi1.html](http://www.tpinst.org/publication-tpi1.html)

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