by Ryan J. Dexter, PE.

The Building Component Safety Information (BCSI) booklets define 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 typi- cally 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 developed by the Truss Plate Institute provides a limit on the number of plies a multi-ply truss can have:

TPI 1-07 Section 7.5.2.4 Maximum Pli es. 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 project, the trusses are delivered to the jobsite pre-fastened by the component manufacturer or delivered singu larly 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 multi-ply truss 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/SFRC/ADS for use of Kf when used per Section 7.3.2. For the purposes of this section, for members braced by shauling, 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 shauling prevents buckling.

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.

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