Technical Bulletin

TrusSteel® *An ITW Company*

Multiple Member Trusses

Purpose of this Bulletin

Many truss layouts require at least one multiple member truss. A multiple member truss (sometimes called a multiple ply, multi-ply or girder truss) is a truss assembly that is made up of several single-ply trusses that are attached together, side-by-side, in order to combine their strength. The multiple member truss is most commonly used as a girder truss because of the high loads typically found on these trusses (of course you can and will have single-ply girder trusses).

The *steelVIEW®* software allows the designer to create a multiple member girder truss that is two or three plies wide. And, the TrusSteel® product line provides the truss manufacturer with clips and hangers to connect a tributary truss to a girder truss. Truss web clips (see Standard Detail TS001) or truss hangers (see Standard Detail TS022) are both available to make these connections. The type of connection is usually determined by the allowable load capacity of the connector and the bottom chord size and gauge of the girder truss. Because of the many factors that must be taken into consideration when selecting and sizing these connections, it is important to bear the following information in mind.

Information

Multiple Member Mechanics

A multiple member truss (girder truss) typically supports additional loads from tributary trusses that are framing into the girder. The ability of the girder truss to support these loads depends directly on the strength of all the truss plies acting together. If the plies of the girder truss were not attached to each other, then the first truss (the one that has the tributary trusses framing into it) would support the entire load from the tributary trusses and it would act and deflect independently from the second and/or third ply truss. But, by selecting and applying the correct ply-to-ply connections, you can assure that the plies of the girder act together and evenly distribute loads across all members.

Top and Bottom Chord Bracing

It is imperative that the top chord and bottom chord of any truss be braced in some manner. This is also true for a multiple member truss. Chord bracing can be achieved in a variety of ways, such as structural decking or purlins attached directly to the truss chords. Just as it is vitally important to properly connect together the members of a multiple member truss so that they all act as one member, it is also vitally important that all the chords in a multiple member truss be braced. You cannot just brace one chord and expect the other chords to perform adequately.

If only one of the chord members in a multiple member truss has the sheathing or purlins attached to it, then it is important to attach all of the chords together so they can benefit from the bracing offered by the sheathing or purlins. Ideally, each chord member of a multiple member assembly would have the sheathing or purlins attached to it. For instance, attaching purlins to all three top chords of a three-ply girder would properly brace all members of the top chord. But, frequently it is simply not practical to make (or assure) the connection to all the truss plies to the deck or purlins.

Truss-to-Truss Connections

TrusSteel trusses can be attached to a girder truss with TTC clips (see Standard Detail TS001) or with TSJH hangers (see Standard Detail TS022). When TTC clips are used to connect trusses to a girder, ply-to-ply connections can also be done using TTC clips. The TTC clips will transfer the loads to all members of the multiple member truss when properly applied. But, this technique (see Standard Detail TS001) offers no bracing support for the chords. When hangers are used to support trusses, ply-to-ply connections are made using 14AMDB2.125 screws (for TSC2.75 chords, see Standard Detail TS023) or 14AMD3.5 screws (for TSC4.00 chords, see Standard Detail TS024A). This technique does offer bracing support to the chord that supports the hanger but no bracing support is given to the other chord.

Ply-to-Ply Connections

Now let us bring together all that we have learned in the previous paragraphs. And, we still need to answer two questions:

First, "What do you use for ply-to-ply connections to achieve proper bracing?" The answer is that you ALWAYS use screws to properly brace the chords. Apply the screws as shown in Standard Detail TS023 (for TSC2.75 chords) and TS024A (for TSC4.00 chords). Even if the sheathing (or the purlins) is attached to every chord member, it is good practice to attach all of the chords together in a multiple member truss.

Second, "Where do you position the ply-to-ply connections?" The answer is that you place a ply-to-ply connection wherever a chord brace is required. For instance, if you design a girder truss with purlins on the top chord at 24" OC and purlins on the bottom chord at 48" OC, you should place a ply-to-ply connection at those same intervals along the chords. If you design the chords of a truss with structural sheathing applied, then the ply-to-ply connections should be made at an interval of 12" OC.

If you have a situation where you have trusses framing into the bottom chord of a girder truss and TSJH hangers are used, then care must be taken to follow Standard Detail TS023 (for TSC2.75 chords) or TS024A (for TSC4.00 chords) in order to transfer the loads to the back members. The screws used in these connection details may or may not be adequate to properly brace the bottom chord.

You will need to determine if you have enough ply-to-ply connections to act as bracing. Compare the purlin spacing that you used when you ran the truss in *steelVIEW* with the spacing of the trusses framing to the girder. If the spacing of the trusses is less than the purlin spacing, then the chord will be braced properly as long as you follow TS023 or TS024A. If the spacing of the trusses is more than the purlin spacing, then the chord will not be properly braced if TS023 and TS024A are followed. In order to brace the chord adequately, you must place additional screws in the chord so that the spacing between screws is equal to the purlin spacing.

Application

Creating effective multiple member trusses is really fairly simple, given the support of the Alpine *steelVIEW* software and the Standard Details. But unusual situations do arise, and you may have questions that the Standard Details or this Bulletin does not answer. When this situation occurs, do not hesitate to call your TrusSteel engineer. Have the specifics of your particular design situation at hand when you call to save time for both you and the engineer. You may want to fax or transmit specific details, sketches or truss designs to the engineer before calling in order to expedite your communications.

Referenced Documents

TS001
TS022
TS023
TS024A

Revisions

- This bulletin was revised on 1/15/03 to update all standard details attached to this Technical Bulletin.
- This bulletin was revised on 11/8/13 to correct bulletin number in footer