**STRUCTURAL BUILDING COMPONENTS MAGAZINE**
November 2002

# The New TPI Quality — Improving QC Efficiency with Engineering Solutions

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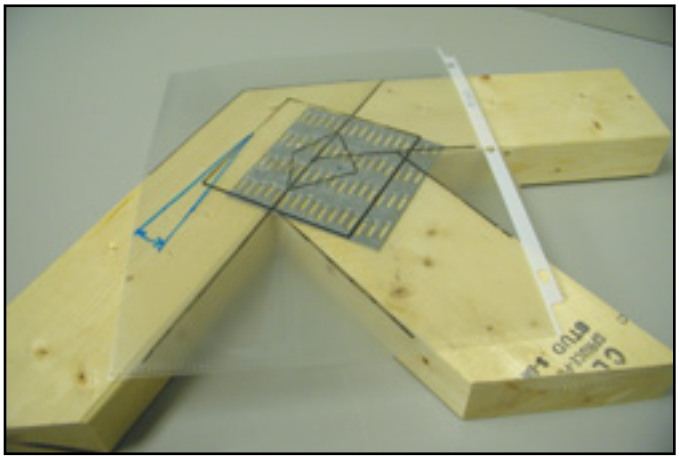
If you have heard about the new Quality Standard coming out in the 2002 edition of ANSI/TPI 1 National Design Standard for Metal Plate Connected Wood Trusses and you have any reservations, concerns or questions with regard to what you have heard about it, keep reading. And for those who have been out of the country for the last year, or perhaps hiding under a rock all this time and have not heard about the new Quality Standard, please keep reading also.



UTILIZING THE JOINT QC DETAIL, PROPER PLATE PLACEMENT UNDER THE PPM INSPECTION METHOD IS QUICK TO CHECK.

In virtually any standard or code, there is always room for future improvement and additional revisions. ANSI/TPI 1-1995, the current industry design standard, is no exception. The process to revise ANSI/TPI 1-1995 involved over three years of work, which resulted in a significant amount of changes that span the member design procedures, joint design procedures, loading provisions and structural quality criteria. All of these changes are intended to improve the reliability of metal plate connected wood truss construction while at the same time ensuring that it is an economical building choice.

A quality standard, which specifies the minimum quality criteria for the manufacture of wood trusses, has been an integral part of the truss design criteria since the earliest design standards. One of the major areas of revision in the TPI 1 standard took place within the quality standard, now found in Chapter 3 (Quality Criteria for the Manufacture of Metal Plate Connected Wood Trusses) of the new standard. MPC wood trusses, like every structural component designed, depend on correct fabrication. Steel beams are designed assuming the mill fabricates the beam correctly. Concrete beams are designed assuming the “mix” is correct, the rebar size and grade are properly manufactured and the contractor places the steel correctly. Metal plate connected wood trusses must be designed assuming that the trusses are manufactured to the specified dimensions, with lumber and plates as specified or better, with accurate placement of the plates at all joints, and with acceptable tight-fitting joints.

Quality control is the critical link between truss design and structural performance. A truss design provides assurance that the specified truss (dimensions, lumber and plates) will adequately perform under the given conditions and for a given set of parameters. A quality control program provides the necessary assurance that the manufactured truss is within those parameters and will perform as was originally intended by its design. Thus, quality control is essentially the lifeline between a truss design and in-service structural performance that

matches design expectations.

The new quality standard (Chapter 3) was developed in an effort to improve the ease and efficiency by which quality control is carried out in the truss plant, and to better balance the needs of manufacturing with engineering. This effort was prompted by feedback from truss manufacturers on the 1995 quality standard (ANSI/TPI 1-1995, Chapter 4) which revealed to WTCA the following:

- Some of the quality requirements were difficult to achieve on a consistent basis given a certain degree of quality inaccuracies inherent to the manufacturing process that cannot be controlled (i.e., not human-error related).
- The requirement to count metal connector plate teeth in order to demonstrate adequate quality was unfavorably time-consuming, thereby increasing the difficulty encountered by truss manufacturers.

The new quality standard is improved in several ways. First, it introduces a faster method for assessing truss quality that does not involve counting metal connector plate teeth, but rather centers quality control on a visual evaluation of the metal connector plate placement at a joint. This new method of quality assessment is appropriately referred to as the Plate Placement Method (PPM) and it is presented as the primary quality assessment measurement for use in a truss plant. In addition to being easily evaluated by plant personnel, metal connector plate placement has been shown to have a direct correlation to structural performance.

The benefit of the new PPM is two-fold. In response to one of the truss manufacturer concerns, it provides truss manufacturers with a more efficient and affordable means to conduct quality control. Secondly, it incorporates an additional level of tolerance into the design to appropriately account for the faster, yet equally reliable, determination of quality, which at the same time will also allow for an amount of occasional, unavoidable quality “defects” during the manufacturing process, without affecting the structural quality of the truss.

**BUT WAIT, THERE'S MORE**

The quality standard has a second method for quality assessment called the Tooth Count Method (TCM), which will be familiar to users of the original standard because it is almost identical to the quality assessment procedures in Chapter 4 of ANSI/TPI 1-1995. The TCM, which involves counting teeth in each plate contact area, still provides a very systematic and precise “accounting” of the joint quality, and therefore provides a backup method of inspection if a joint does not pass the first level of criteria per the PPM.

Finally, and perhaps most importantly, another significant change is that the extra tolerances for the structural quality of truss joints are considered during the truss design process, and the truss manufacturer can affect how much tolerance is built into the design. The truss manufacturer gets to choose the level of built-in quality tolerance based on their manufacturing practices, quality assurance needs and demonstrated conformance with minimum quality standards. Increased tolerances (20 percent) will permit faster quality control (PPM); lesser tolerances (< 20 percent) will require more extensive quality control (TCM).

And consider this—a built-in tolerance of 20 percent does not mean a 20 percent increase in plate areas. This very important point has been made in the Executive Director's Message in the May 2002 issue of SBC Magazine, but it is being emphasized again, and will continue to be reiterated until it is fully understood. The following was outlined in that article: The expected worst-case plate increase is 7 percent, which translates into an increased truss cost of well less than one percent (0.28 percent of 1 percent—not to be confused with 28 percent!), whereas the expected typical plate increase will be three percent, which translates into an even smaller increase in truss cost of 0.16 percent. (or in dollar terms six cents [$0.06] on forty dollar [$40] truss.)

A structural quality standard that can be consistently met is important to TPI's mission of maintaining the wood truss industry on a sound engineering basis. The greatest assurance that a manufactured truss will perform as was originally intended by its design results from a combination of:

- Designs that account for some quality inaccuracies inherent to the manufacturing process.
- Quality control protocols that work to consistently produce trusses in accordance with the truss designs.

Thus, the intent of the changes made to the quality standard is to improve the quality control process for truss manufacturers in recognition that maintaining overall quality of wood trusses is in the interest of public safety and welfare.

Note: To learn in detail what the new quality standard entails and to better understand the two methods of quality assessment, please be sure to obtain and read a copy of the TPI standard and corresponding commentary to the standard.

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