

## **Reinforcements perpendicular to the grain using self-tapping screws**

**by**

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The tensile strength perpendicular to the grain is the lowest strength value of timber. The characteristic tensile strength perpendicular to the grain for solid timber is only a small fraction of the tensile strength in the grain direction. Timber structures therefore should be detailed in order to minimise tensile stresses perpendicular to the grain.

Examples for structural details where tensile stresses perpendicular to the grain occur are notched beam supports, connections with load components perpendicular to the member axis or beams with holes. Glued-in threaded rods and glued-on plywood gusset plates are traditionally used as reinforcements. Screws with continuous threads present an alternative to the traditional reinforcement methods. With diameters up to 12 mm and lengths up to 600 mm, screws may be used in many structural members as a tensile reinforcement perpendicular to the grain.

The research project "Reinforcements perpendicular to the grain using self-tapping screws" shows the efficiency of these screws used as tensile reinforcements perpendicular to the grain. They are designed using the same models as for the conventional reinforcements. Further on, the research project shows possibilities to avoid the splitting at timber-to-steel connections with multiple fasteners in a row. Here, a calculation model is proposed to design the self-tapping screws as reinforcement in timber-to-steel connections.