

Structural safety and robustness of connections in wide-span timber structures – evaluation of an exemplary truss system

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Abstract

Following the Bad Reichenhall ice-arena collapse, numerous expertises on the structural safety of wide-span timber structures were carried out at the Chair of Timber Structures and Building Construction. It became evident that inadequate structural design and detailing as well as inadequate manufacturing principles were the main reasons for observed failures. The design and manufacture of connections in wide-span timber structures are still amongst the most challenging tasks for both the structural engineer as well as the executing company. This paper will, on the basis of an exemplary expertise, discuss specific issues in the structural reliability of connections in wide-span timber trusses and give recommendations towards a state-of-the art design of such connections.

Introduction

The discussed truss system supports the roof of a 2-field gymnasium (31 x 27 m). The eight glulam trusses each span 30.6 m, resting on glulam columns. Two trusses at a distance of 2 m form a window-strip. Vertically laminated beams, connected to the side of the bottom flanges and spanning 6 m, form the roof between two pairs of trusses.

The flanges and posts are glulam elements from larch lamellas and steel rods form the diagonal tension members. All joints are realized by steel plates and dowels. Due to transportation reasons, the trusses were delivered in two parts, giving the need for two main joints in the glulam flanges.

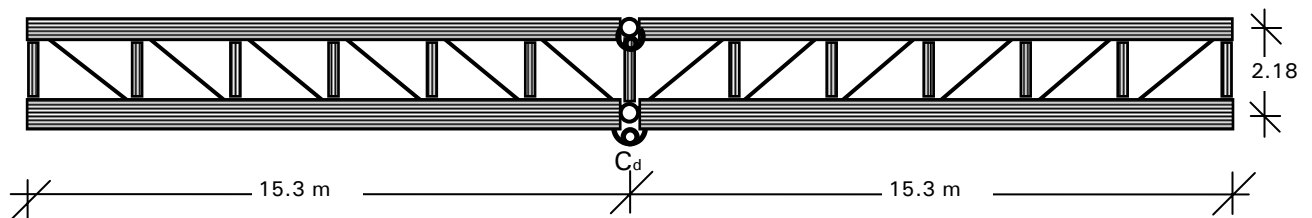


Fig. 1: Truss System

Since the quoted expertise forms the basis of legal procedures, the full paper shall not be published before the official opening of court procedures (expected mid-October). We apologize for this inconvenience.