

# Reliability of roof truss with punched nail plates

*Martin Hansson, division of Structural Engineering, Lund University, Sweden*

*Peter Ellegaard, Department of Building Technology and Structural Engineering, Aalborg University, Denmark.*

In this study, a reliability analysis is conducted for a roof truss of W-type with punched nail plates.

Reliability studies of roof trusses have been presented by for example (Gupta and Gebremedhin 1992), (Bulleit and Yates 1991) and (Dalsgaard Sørensen and Damkilde 2003). In former analyses most often the material properties has varied only between timber members, the analysis have been linear elastic and the joints have been pinned or rigid. In this study the strength and modulus of elasticity have been modeled stochastically both between and within timber elements. The capacity of the roof truss has been calculated with a non-linear model developed at Aalborg University and with the properties of the punched metal fasteners as stochastic variables. The input data is based on experiments.

Output from Monto Carlo simulations of the roof truss is then further used in a reliability analysis.

Bulleit, W. M. and J. L. Yates (1991). "Probabilistic Analysis of Wood Trusses." Journal of Structural Engineering-Asce **117**(10): 3008-3025.

Dalsgaard Sørensen, J. and L. Damkilde (2003). "Load bearing capacity of roof trusses." Aalborg University, Dept. of Building Technology and Structural Engineering Paper no. 226: 12.

Gupta, R. and K. G. Gebremedhin (1992). "Resistance Distributions of a Metal-Plate-Connected Wood Truss." Forest Products Journal **42**(7-8): 11-16.