Short description of activities at the Dept. of Structural Engineering, Lund University, related to COST Action E24		
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Main topics	**Example of activities**	**Number of scientists**
• **Reliability analysis of structures**	Calibration of partial coefficients Evaluation of duration of load (k_{mod})	4
• **Strength of Structural timber**	Modelling the variability of timber properties Length and load configuration effects Influence of wood properties and fibre morphology on timber strength	3
• **Analysis of timber systems**	Design of trusses using models of variability System effects of timber elements	3
• **Wood and moisture**	Drying of wood Internal stresses in wood elements caused by natural humidity variations Serviceability, movements in timber framed buildings	4
• **Timber frame buildings**	Horisontal stability of timber frame buildings Multi-storey timbe frame buildings	3

Main equipments : testing machines, climate rooms

Activities related to the field of COST Action E24

Reliability calibration of safety factors and duration of load factors for structural timber

(S. Svensson, S. Thelandersson, H. J. Larsen, T. Isaksson)

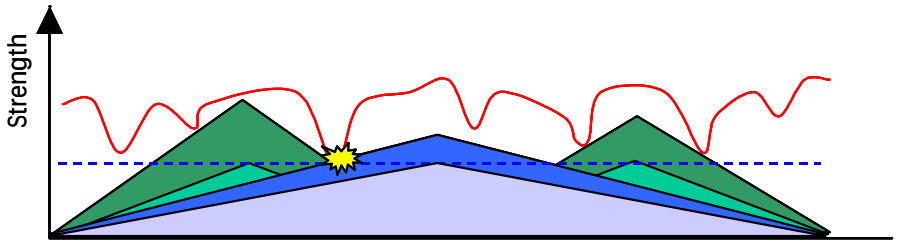
The purpose with the project is to evaluate the design rules valid for timber structures in the Swedish code. Reliability calibrations of the material partial coefficients for timber and other wood based products under short term loading were performed. Furthermore, the influence of long-term loading on timber structures were studied by simulations of 50 year sequences of snow load, imposed loads (dwellings and offices) and wind load. The long term effects on the material were described with damage models available in the literature. As a result the duration of load factor k_{mod} was assessed for different type of loads. It was confirmed that the values given in Eurocode 5 is very reasonable.

The results from the project were summarised in the form of a concrete proposal for a revision of the Swedish code.

Within Member Strength Variation

(T. Isaksson, S. Thelandersson)

The main goal with the project is to gain a better understanding of the implications of the lengthwise variation in strength of timber members, and to study its consequence on reliability of timber structures in different situations occurring in practice. A stochastic model for length wise variation of strength, based on extensive test results for Swedish timber has been developed. This is applied in various studies of reliability of timber elements and systems. The project is completed and a Ph.D. thesis describes the results of the research.



System effects of elements of structural timber

(T. Isaksson, M. Hanson)

Study on the system effect of sheathed timber structures, such as roof elements. In an experimental investigation various parameters, which define the properties of such a system, are studied. The variability within and between members of the system is also taken into account. Systems are generated using Monte Carlo simulations and the system effect is evaluated by direct comparisons of strengths and by reliability methods.

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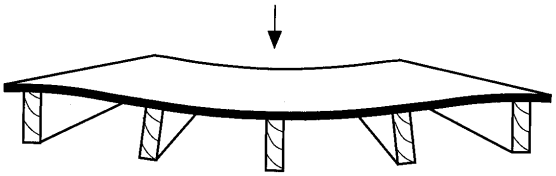
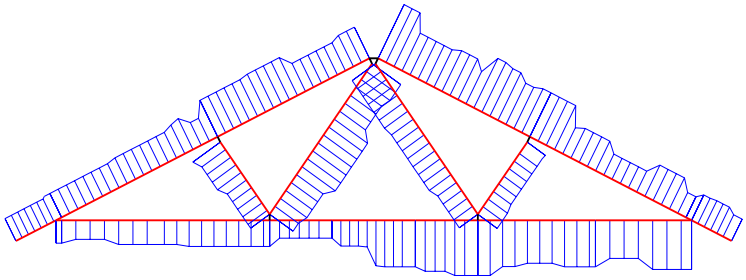


System reliability of timber structures with particular application for roof trusses

(M. Hansson, S. Thelandersson)

Structural timber exhibits a significant statistical variability both between members and within members. The consequences of this variability for the reliability (safety level) in timber structures are not fully understood. To study this effect a roof truss is chosen to perform computer analysis (using the Monte Carlo method). Some of the stochastic variables that are to be studied are between and within member strength, external loading and variability in joint behaviour. Further the reliability of timber truss system is affected by structural load sharing including non-linear behaviour of joints.



Influence of wood properties and fibre morphology on timber strength

(C. Foley, A. Mårtensson)

The main aim with this project is to identify characteristic properties with regard to knots, disturbances in the fibre alignment and other wood properties that affect the strength and the failure mechanisms in timber. Focus is put on the effects of knots, their size and position and the number of knots. Since the weak zones often determine the strength of timber, better knowledge about these zones could lead to a better usage of the timber with regard to strength.

Selected references

Svensson, S., Thelandersson, S (2000). *Aspects on reliability calibration of safety factors for timber structures*. CIB W18 Meeting 33, Delft Netherlands. Also accepted for publication in Holz als Roh und Werkstoff.

Larsen, H. J., Svensson, S., Thelandersson, S., (1999). *Determination of partial coefficients and modification factors*. CIB-W18 Meeting 32, Graz, Austria.

Svensson, S., Thelandersson, S., Larsen, H. J., (1999). *Reliability of timber structures under long term loads*. Materials and Structures, Vol. 32 (pp 755-760).

Thelandersson, S., Larsen, H. J., Isaksson, T., Svensson, S., (1999). *Säkerhetsnivåer för trä och träprodukter i konstruktioner (Reliability levels for structural timber and timber products).* In Swedish. Report TVBK-3039, Dept. Of Structural Engineering, Lund University.

Hansson, M., Thelandersson, S (1999). *System reliability of timber trusses*. RILEM Symposium in Timber Engineering, Stockholm.

Isaksson, T. (1999). *Modelling the variability of bending strength in structural timber – Length and load configuration effects*. Report TVBK-1015, Dept. Of Structural Engineering, Lund University.

Mauritz, C., Håkansson, T. (1999). *Systemeffekt i träbjälklag (System effects in timber elements).* In Swedish. Report TVBK-5100, Dept. Of Structural Engineering, Lund University.

Andreasson, S., (1999). *System aspects of stabilisation of multi-storey timber framed buildings*. PTEC, 1999, Int. Conf. on Timber Engineering, Roturoa, New Zealand. (8p).

Hansson, M., Thelandersson, S., (2000). *Effect of within member variability on the reliability of timber trusses*. WCTE 2000, Whistler BC, Canada.