

A Probabilistic Approach for Robustness Evaluation of Timber Structures

John Dalsgaard Sørensen & Poul Henning Kirkegaard

The Department of Civil Engineering
Aalborg University, Aalborg, Denmark

Abstract

Robustness is introduced in the Danish Code of Practice for Safety of Structures as a general requirement to all structures in order to reduce the sensitivity of the structure with respect to unintentional loads and defects that are **not** included as ‘ordinary’ loads in the codes and design requirements. Robustness should be distinguished from accidental loads although some of the design procedures and measures are similar i.e structures should be robust regardless on the likelihood of accidental loads. For structures in high safety (consequence) class robustness shall be documented by preparation of a technical review where at least one of the following criteria shall be fulfilled: a) by demonstrating that those parts of the structure essential for the safety only have little sensitivity with respect to unintentional loads and defects, or b) by demonstrating a load case with ‘removal of a limited part of the structure’ in order to document that an extensive failure of the structure will not occur if a limited part of the structure fails, or c) by demonstrating sufficient safety of key elements, such that the entire structure with one or more key elements has the same reliability as a structure where robustness is documented by b). Based on the Danish code and JCSS PMC, the present paper proposed a probabilistic approach for evaluation of robustness of timber structures. A Norwegian sports arena with a structural system of timber frames and an Austrian timber bridges are respectively considered in two examples.