Fire resistance of engineered wood structures

Summary

The PhD study is proposed on fire resistance of engineered wood structures involving behaviour of bondlines. New European design models for load bearing capacities of engineered wood will be verified and improved. Classification methods for adhesives as basis for choosing appropriate fire design models will be developed.

Research field:	Building and civil engineering and architecture
Supervisor:	Prof. Dr. Alar Just
Availability:	This position is available.
Offered by:	School of Engineering
	Department of Civil Engineering and Architecture
Application deadline:	Applications are accepted between November 15, 2021 00:00 and December 15, 2021 23:59 (Europe/Zurich)

Description

Fire safety of building structures is currently a significant research topic in structural engineering. The optimization of engineered wood structures is an important challenge for the economy. The revision of European building design codes (Eurocodes) will be finalized in 2025. EN 1995-1-2 (Eurocode 5 Part 1-2) dealing with fire design of timber structures may be part with the greatest planned improvements. Scientific input is needed to improve and verify the content.

Although the current European design standard includes appropriate guidance for rectangular sawn wood and glued laminated timber, the market share of other engineered wood products has increased significantly. Engineered wood products often include adhesives. The behaviour of adhesives in fire conditions can influence the fire behaviour of the entire structure. The amount of different adhesives in the market is increasing. Entering of CLT to the market raised a need to revise fire design models for engineered wood. The effect of various types of adhesives on the load-bearing capacity of timber members is studied in a European project titled FIRENWOOD under the umbrella of ForestValue ERA-Net.

PhD study will consist of thermal simulations and fire tests completed with analysis. The overall goal of this PhD study is to develop new and improve the existing analytical models for fire resistance design of glulam, cross-laminated timber, finger jointed solid wood and other engineered wood structures. Validation of the improved methods and a sensitivity analysis of the improved design methods will be performed. Test methods for classification and for development of adhesives for engineered wood in fire will be developed.

The PhD student will take part in the analysis and final reporting of FIRENWOOD as well as the application of results after the end of FIRENWOOD project. During the PhD study there will be fire tests done in Sweden, Norway and Germany.

Applicants should fulfil the following requirements:

- MSc degree in structural engineering;
- Practical experience in design of timber structures;
- Deeper knowledge of fire resistance of timber structures;
- Practical experience in fire experiments with timber would be beneficial;
- Fluent English is expected.

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