IMPROVED SOUND INSULATION IN MODULE BASED TIMBER FRAMED BUILDINGS

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1. INTRODUCTION

This paper describes an ongoing research project at Luleå University of Technology. The project deals with module based lightweight building systems where building volumes are industrial prefabricated and then transported to the building yard for assembling. The size of each module can be approximately 8x4 m^2. The technique has the same typical drawbacks as other similar lightweight building constructions, i.e. poor sound and vibration performance at low frequencies, although the concept invites to some unique solutions which could benefit the sound properties. The overall objective of the project is to find new/modified economical constructions which enable module based wooden buildings to fulfill stated building codes with reasonable margin. Various constructions, and thereby various sound properties, should be offered according to the customers demand. The project contains a number of sub studies which are presented below.

2. IMPACT SOUND MEASUREMENTS

The impact sound pressure level was measured for a set-up that consisted of two volumes, one upon the other. This introductory study aimed to figure out how a specific construction responds to certain construction changes. Some examples: using underlayer foam in stead of grey rag board under parquet floor, adding an extra layer of floor gypsum board and excluding centering metal studs used for guidance during assembling.

3. STATISTIC EVALUATION

In total 24 measurements regarding impact sound within the same four-storied building project was used for statistical analysis. Three parameters where checked for significance; Room size, floor surface and storey.

4. TEST OF INSULATION STRIP

A previous small-scaled test had indicted that a special insulation strip between volumes in vertical direction had no effect. To further examine this phenomenon a field study regarding impact sound and airborne sound insulation were performed.

5. FIELD MEASUREMENTS

In this case impact sound and airborne sound insulation were measured inside a two-storied office building. The objective was to find out the effect from minor construction changes to a specific construction in field condition. Some examples: Excluding intermediate boards inside the floor, adding extra layer of gypsum board to the floor and to the ceiling and using elastic glue instead of traditional.

6. LABORATORY MEASUREMENTS

Here, a floor section was tested with respect to impact sound. The construction of the floor was altered in numerous ways in order to get indications how to design a better floor. Some of the parameters that were investigated; Increased total floor height, gypsum board from different manufactures and of different quality, mineral wool of various density, increased amount of gypsum boards and floating floor.