THE UNTAPPED POTENTIAL OF WOOD IN DEVELOPING ENERGY-EFFICIENT LIVING SPACES

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ABSTRACT: In 2013, Aalto University started an interdisciplinary research project called “Wood Life- Energy-efficient living spaces through the use of wooden interior elements”, where the focus is on the wood material’s potential to enhance the energy-efficiency of housing. One part of the project is bringing the research themes into interdisciplinary teaching as well. This paper discusses the collaboration in the project between the disciplines of architecture and wood technology and the first results of the studies carried out by students in the Aalto University course “Integrated Interior Wooden Surfaces” during the 2013-2014 Academic Year.

KEYWORDS: design & build, interdisciplinary, teaching and research, wooden floor, Wood Life

1 WOOD HAS IT ALL

Wood, a hydroscopic and truly renewable material with low-embodied energy and carbon storage ability, is already used extensively as a building material. In addition to its excellent structural properties it can act as moisture [1, 2], and thermal [3, 4], buffer. This ‘buffering’ ability of wood and natural fibres could, in turn, lead to a reduced energy demand [5, 6], and gives wood great potential to passively mediate the internal climate of a living space.

A person’s sensation of warmth can be influenced not only by the ambient temperature, but also by the prevailing relative humidity (RH), mode of heat transfer (convection, conduction or radiation), airflow rate, as well as psychological aspects.

Simply investigating the material’s potential to achieve a reduction in energy use in isolation is insufficient; it is imperative to combine the use of materials with spatial design that maximises this potential and to judiciously modify the properties of wood to enhance its functionality.

Aalto University has started an interdisciplinary research project “Wood Life- Energy-efficient living spaces through the use of wooden interior elements”, where the focus is on the wood material’s potential in enhancing the energy-efficiency of housing. One part of the project is bringing the research themes in to interdisciplinary teaching as well.

Wood architecture and wood construction are taught in three different schools at Aalto University: the Department of Architecture at the School of Arts, Design and Architecture, the Department of Civil and Structural Engineering at the School of Engineering, and the Department of Forest Products Technology at the School of Chemical Technology.

This paper describes how aforementioned research themes are brought to the project based course “Integrated Interior Wooden Surfaces” in the spring term 2014. The leading principle in the course is to bring together Master level students of wood products technology, wood architecture and wood construction [7].

2 INTERACTIVE LEARNING AND NEW APPROACHES

Adjusting to the various approaches to the project and to the learning of students from different fields is a challenge, but also an opportunity to bring new energy and ideas to research, development and teaching [8]. In co-operation with Wood Life, the project-based course “Integrated Interior Wooden Surfaces” (4 ECTS) was organised in spring 2014. The leading principle in the course has been to bring together Master’s level students of wood products technology, wood architecture and wood construction. Project-based learning enforces students to be active participants, but concurrently develops their working life skills [9].

The project work was carried out in small groups. Each group had members from the disciplines of architecture and wood technology; one was also a student of structural engineering. The course work included multi-scientific
research, the writing of a pre-assignment and learning diary, empirical studies and a small-scale design and build project. The approach allowed students of various backgrounds to utilize their strengths at different stages of the project and to learn from each other’s experience and know-how. The final results will be exhibited in 2014.

2.1 EXPERIENCING WOOD

The selected theme for the course project was to study, design and build an example of a pleasant wooden floor surface utilizing the multifunctional properties of wood material. In this course, the functional properties of wood included thermal, acoustic, moisture buffering, antibacterial and aesthetic properties, as well as wood material’s psychological and physiological effects on humans. As part of the course, the project groups carried out background research and multi-scientific empirical studies with regard to the subjective user perceptions of floor surfaces.

Students were asked how the functional properties of wood could be utilized in floor applications and what makes a wooden floor pleasant and desirable. All groups were given the freedom to choose their own approach to the topic.

3 CONCLUSIONS

In co-operation with project Wood Life, the course “Integrated Interior Wooden Surfaces” took place in spring 2014. As part of the course, multi-scientific, empirical studies with regard to subjective user experiences of floor surfaces were commenced. Work was realized in collaboration between the disciplines of architecture and wood technology. The aim was for a holistic approach to the project including research, empirical studies and a design & build project as for all participating students to be able to add with their own expertise. The results are in line with earlier studies and the final floor samples show innovative approaches to the recycling, replacing and sensation of wooden floors. The topic will be explored further at the Aalto University as part of project Wood Life - Energy-efficient living spaces through the use of wooden interior elements utilizing existing test pods [10].

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REFERENCES