Sustainable Thermal and Acoustic Retrofitting of Façade Walls

With the growing need to meet modern energy demands as well as an optimal acoustics comfort of homes, Sweden is facing an acute issue with a decreasing property portfolio and a huge lack of homes in the country. Preserving the 1960s residential buildings, and doing so with a retrofitting that bridges the thermal and acoustic properties is the answer to this issue.

The cheap and fast building methods during the 1960s campaign of 'A Million New Homes' did not result in the homes being energy efficient nor being equipped with good acoustical properties. Today, there is a growing need for these old homes to meet new energy efficient standards as well as an optimal acoustics comfort in homes.

Many studies have mainly focused on retrofitting options to improve the energy efficiency of old buildings but limited work has been done to cover improvement regarding acoustic properties. A new study has now bridged the gap in existing research to achieve a balanced improvement in both the thermal and acoustical properties while retrofitting.

During the analysis, the study firstly looks into the thermal and acoustical performance of the original façade constructions. This was then compared against simulated performances of two different proposed retrofitting options. The performances are evaluated on two scenarios - retrofitting on the outside versus retrofitting on the inside of the façade wall. The proposed retrofitting options provide some insights as to the expected improvements of the thermal and acoustical properties when the façades of these buildings are retrofitted with added insulating materials.

Based on the outcome of the analysis, the study found that for heavy façade constructions, the retrofitting options proposed resulted in an improvement of both the thermal and acoustical properties of the buildings. Also, the thicker and heavier the retrofitting structure is, the larger the improvement of the building is seen. This is more exemplified during a scenario where there is a lower resonance frequency. On the other hand, when looking at an original construction made of lightweight façade, the proposed retrofitting option improves the thermal properties; however, it does not improve the acoustical properties of the building. An improved sound reduction index comes with a heavy construction structure. This therefore highlights that in a lightweight façade, it would be easy to improve the thermal properties; however more serious consideration is required during a retrofitting process, so as to achieve an improvement of the acoustical properties of the building.

In conclusion, the study highlights that there are merits to retrofitting old buildings in order to achieve both a balanced improvement in thermal and acoustical properties. It is however much easier when the original structure is of a heavy façade instead of a lightweight façade.

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