

Reflection

The aim of the current thesis is to explore solutions in façade level in order to provide natural ventilation while keeping high comfort levels in the indoor environment in high-rise office buildings in the Netherlands. This topic was selected because it combines the extensive knowledge of building physics about acoustics and thermal analysis and at the same time requires the development of a technically smart façade design. The goal of this thesis is closely related to sustainability as the purpose of the design is to preheat and precool the fresh air and at the same time to allow natural ventilation even in noisy urban centers.

The research results indicated that there is a potential in the application of pcm and sound absorbing materials in the cavity of box-windows. In order to make proper estimations about the feasibility and the effectiveness of the developed concept, calculations were realized about the temperature variations in the cavity during different weather conditions while the sound pressure level reduction was calculated by considering several materials and the respective areas. Although the choice of the implementation of PCM in the cavity of the double skin facade panel resulted in effective temperature control in the cavity, especially during summer months, the process of calculating the behavior of PCM in correlation to factors such as solar radiation and the provided airflow was quite time consuming and challenging. Consequently, due to the limited time, the conducted calculations were not verified by realizing measurements in a prototype or by simulating a model in a computer software. Therefore, those steps could be accomplished in a further research where measurements and simulations will indicate the design's performance under several weather conditions.

In addition, in further research the design could be implemented in a more complicated facade where composite will be used as load bearing components. Also, other solutions including the use of other materials such as wood could be explored. Finally, the performance of the suggested design could be tested in several regions while implementing new design improvements to meet indoor comfort levels for different climates.

