

Model validation embedded Phase Change Material in facades with heat flux sensors

Introduction

[GLASSX](#) is a Swiss company developing and marketing facade products that have unique optical and thermal characteristics (i.e. by using phase change material (PCM)). These translucent facade elements have the advantage of higher energy efficiency due to the combination of translucence, low U-values, variable solar gains and high thermal mass. For product improvements, they developed together with Lucerne University of Applied Science a theoretical model, which includes the sub-cooling effect of the salt hydrate PCM. To validate the model, heat flux sensors from greenTEG were used. The study is described in detail [here](#) (only in German).

Experimental setup and results

In the following picture, the experimental setup is shown. To determine the energy flow into the glass and the release from the glass as response from a defined temperature profiling, gSKIN heat flux sensors from greenTEG were used. The gSKIN® heat flux sensor were mounted to the window by normal tape.

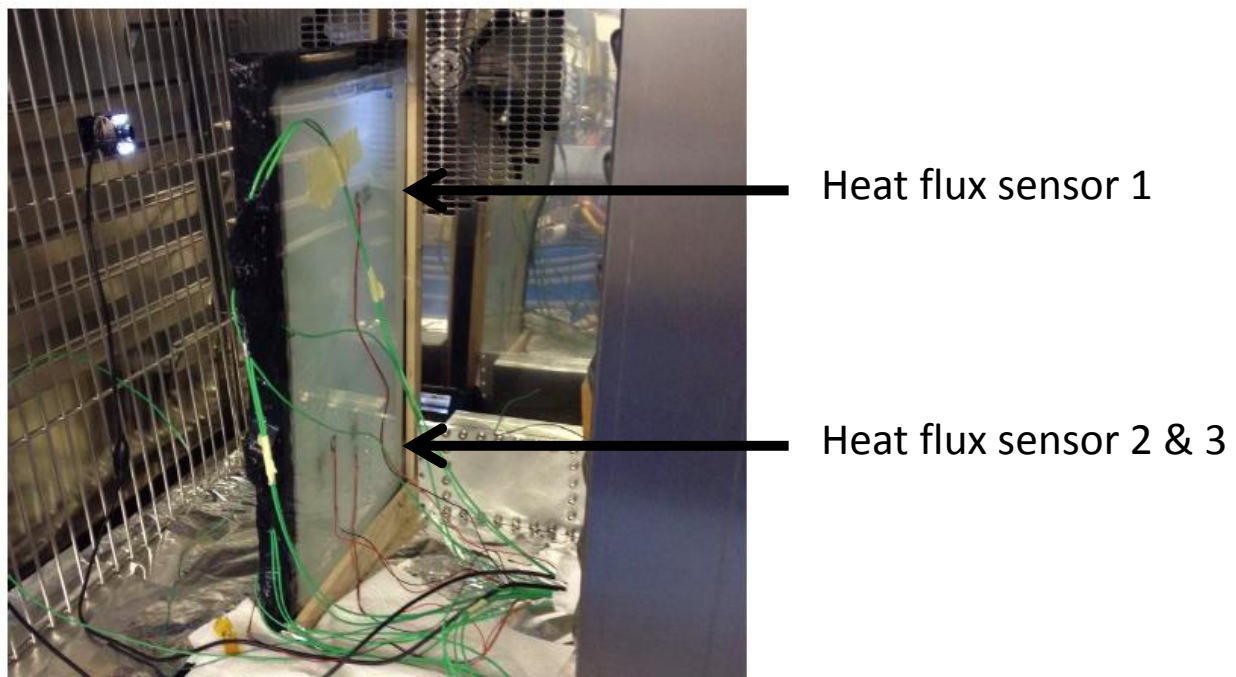


Figure 1: Setup for window characterization containing PCM: Image provided by GLASSX.

The following graph shows the comparison between measured and simulated heat flux. According to the authors, the measured heat flux fits very well the calculated heat flux.

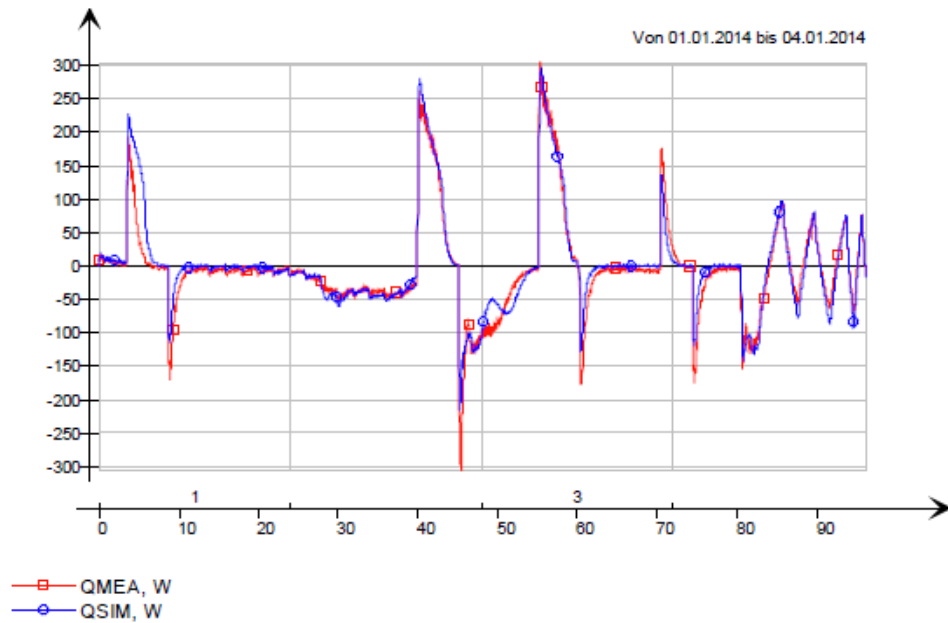


Figure 2: Measured (red) and calculated (blue) heat flux into and from the PCM containing window according to special applied thermal profiles, graph provided by GLASSX

Conclusions

It can be said, that the heat flux sensors from greenTEG were successfully used to validate a theoretical model on the behavior of PCMs in windows. The measured heat flux data fits very well to the calculated data from the model.

The gSKIN-XO heat flux sensor is a powerful tool to analyze the characteristics of thermal energy storage of PCMs in its special application.

Martin Schröcker, CEO of GLASSX, mentioned: **„Having access to a highly accurate and reliable sensor which was at the same time simple to use helped us a lot in measuring the performance of our Phase Change Material energy storage units. Using greenTEG sensors has allowed us to better understand and further improve our products.“**

References

Plüss, I., Kräuchi, Ph., Bionda, D., Schröcker, M., Felsenstein, S., Zweifel, G., 2014.

Modellbildung in IDA - ICE eines Phasenwechsel – Fassadenelements, Konferenz BauSIM 2014, Aachen