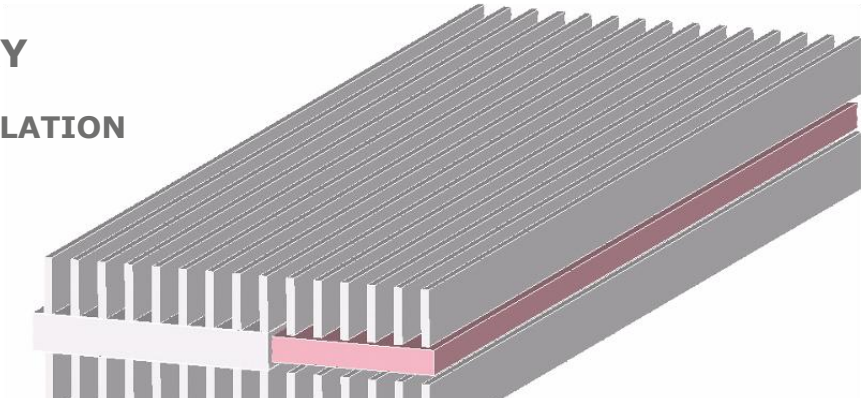


THERMAL BATTERY

LATENT HEAT ACCUMULATION VIA PCM



Transient (time-dependent) simulations have been used to determine the appropriateness of thermal batteries in shelter climate control.

The physical characteristics of latent heat accumulation are calculated numerically. That way, functionality and efficiency can be simulated and checked.

To facilitate this, operating and boundary conditions such as

- Temperature ranges,
- Characteristic lines,
- Temperature curves/profiles

must be known or rather be clearly defined.

The use of PCM (Phase Change Material) leads to a phase transition, from solid to liquid, when reaching its melting point. A certain amount of heat is being absorbed by the PCM during the process to keep a constant temperature. This explains the term "latent heat". Once the phase transition has been completed, the temperature keeps rising with a time lag. With an appropriate cooling, the phase transition is reversed while emitting the stored heat.

With the environment cooling off, the decrease of the system temperature can be delayed or even completely prevented due to the reversed phase transition and its heat dissipation. This might contribute to the avoidance of extreme temperatures (hot-cold alternation).

Significant advantages of the latent heat accumulation:

- Usage of sensible and latent heat
- Storage of temporarily high amounts of heat
- Regulation of temperature fluctuations
- Avoidance of temperature peaks

