

Thermally responsive building membranes

It is well known that we as humans react to the temperature and the direct and indirect solar radiation on our bodies. People in our part of the world (Scandinavia) spend 90% of our time indoors, during which time we work, exercise, teach, eat and much more. We are dynamic individuals, and we respond individually to temperature. Therefore, buildings are important as the link between man and her/his environment, which is also dynamic. Despite this dual dynamic, both indoors and outdoors, buildings are usually static structures.

The architectural research project 'Thermally Responsive Building Membranes' initiates studies of how to create dynamic building surfaces that respond to stimuli and how the membranes can change their shape by using the local thermal energy for their movements.

The research effort is an interdisciplinary collaboration between Aalborg University, the AREA workshop, Aarhus Architectural School and KEA. This means that the group includes researchers in architecture, engineering and perception psychology who contribute with insight and aid the development of the project in terms of thermal, acoustic, architectural, and behavioural perspectives.

The research effort, which the COWI Foundation supports with 100,000 kroner, will focus on developing and implementing a specific building membrane in a training context. Thermal and acoustic environments are registered while behavioural observation and analysis of users in the rooms are used to create a broad understanding of the impact of responsive membranes on the experience of the quality of the architecture. The perspective is an architecture that meets and exploits the thermally dynamic aspects, reducing the energy consumption of buildings while increasing the quality of life in indoor environments.