Climate Adaptive Skin

The next generation façade

RESEARCH SCHOOL
INTEGRAL DESIGN OF STRUCTURES

Speerpunt BOUW

Subject

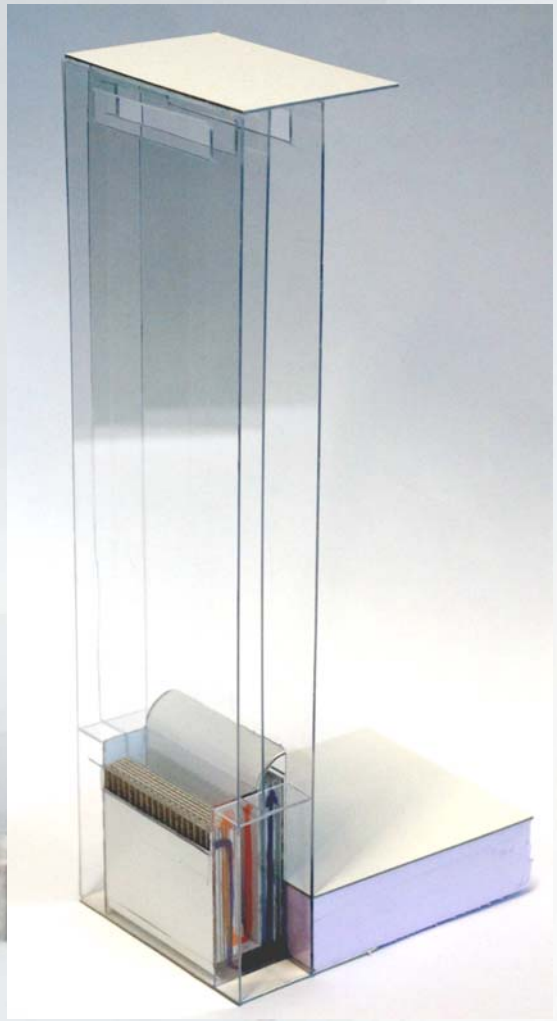
Increasing user comfort while reducing primary energy consumption of commercial buildings by integrating building services into the façade.

Goal

Create guidelines and/or a manual for designers and consultants on how to integrate technologies into the façade with the goal to increase user comfort while reducing energy consumption.

Expected Results

At the end of the research, a manual containing guidelines and additional information, together with a functional simulation model is expected to be available for designers and other parties involved in the façade business.



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Program / Subprogram	DISC / Skins
Host University	Delft University of Technology / Architecture

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Subject
The outdoor climate changes through time and season, alternately supplying energy to and drawing energy from the building skin. Yet, current building skins rarely utilise or react to these changes. The Climate Adaptive Skin (CAS) differs from 'conventional' façades in a way that it is able to adjust its characteristics to and mediate between the changing environments, in order to increase user comfort while reducing primary energy consumption of commercial buildings.

Goals
To create guidelines and/or a manual for designers and consultants on how to integrate technologies into the façade in such way that user comfort increases while energy consumption for climate control is reduced.

Research Question
- What would be the ideal thermal behaviour of a building skin for optimal thermal comfort?
- How can optimal thermal behaviour for optimal thermal comfort be achieved with a minimal amount of energy use?

Strategy
Through 'research by design' an optimal façade design is created: a preliminary design is created based on certain demands for performance. By simulating and evaluating the design, its shortcomings and potentials are determined, which are used for an improved design. The design thus evolves, until the façade performance meets the design requirements. By simulating the design, its performance can be assessed. A prototype will provide further insight into the quality of the design, and at the same time provide feedback on the quality of the simulation model.

Expected Results
At the end of the research, a manual containing guidelines and additional information, together with a functional simulation model is expected to be available for designers and other parties involved in the façade business.

Preferred Partners Applications / Sponsors
- Façade construction industry
- Research institutes

Prime Publication / Prototyping
- Hasselaar, B.L.H., Spoel, W.H., Bokel, R.M.J, Cauberg, J.J.M. (2007) 'Simulation of the thermal performance of a Climate Adaptive Skin', CISBAT conference, Lausanne, Switserland.
- Hasselaar, B.L.H. (2007) 'The Climate Adaptive Skin, the integral solution to the conflict between comfort and energy performance', CIB conference, Cape Town, South Africa.

Research Period
2005 – 2009