

IBK2

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Solar thermal venetian blind

Energy efficiency and transparency in architecture

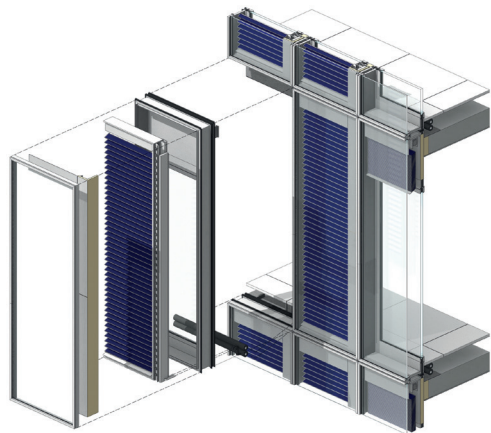
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Concept

Partners from research, industry and trade are developing two new concepts for architectural design of solar thermal facades within the “ArKol”¹ project, which is supported by the German Federal Ministry for Economic Affairs and Energy (BMWi). The solar thermal venetian blind combines the benefits of conventional venetian blinds and solar thermal collectors. This concept allows thermal use of solar energy to be integrated into transparent, i.e. glazed, areas of the façade and simultaneously offers the complete freedom of movement and functionality of a solar-shading device. Heat pipes are integrated into the slats, so that the heat generated in the absorbing slats can be transferred via a switchable thermal coupling to a vertical header tube at the side, without liquid being transferred between the components. This heat transfer concept allows the slats to move freely as in a normal venetian blind. The solar thermal venetian blind is primarily suited for double-skin facades. The cavity acts as a covered collector with good protection against the weather. In addition to generating heat from renewable energy, the solar thermal venetian blind can also serve to extract excess heat from the façade construction. This reduces the temperature in the double-skin cavity and thus on the indoor glass surface. As a result, less heat enters the building, reducing the solar gains and thus the cooling demand.



Exploded-view drawing of the solar thermal venetian blind in a possible façade construction

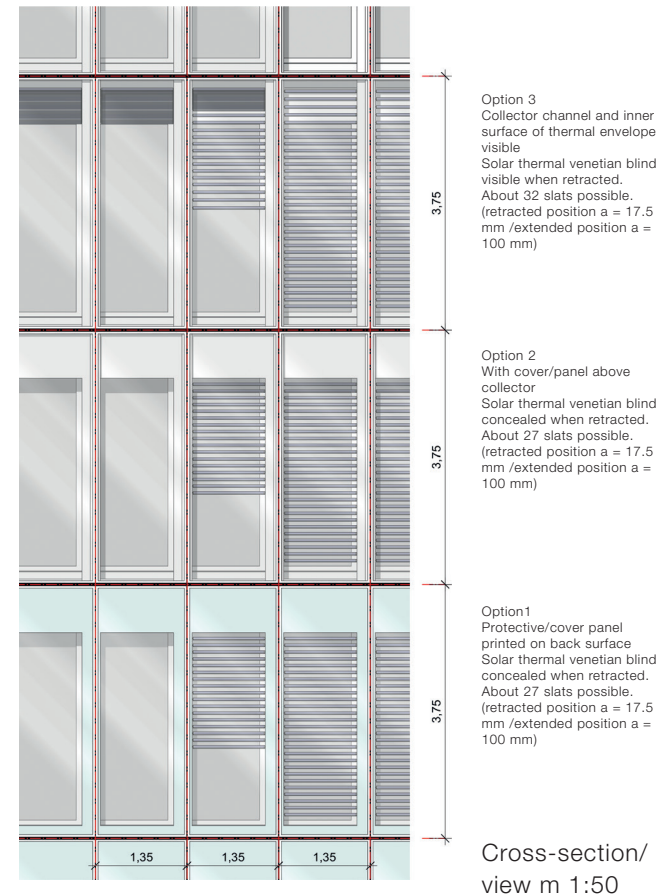
¹ “ArKol – Entwicklung von architektonisch hoch integrierten Fassadenkollektoren mit Heat-Pipes” (FKZ: 0325857A) (ArKol – Development of architecturally well integrated façade collectors with heat pipes)

Demonstration unit

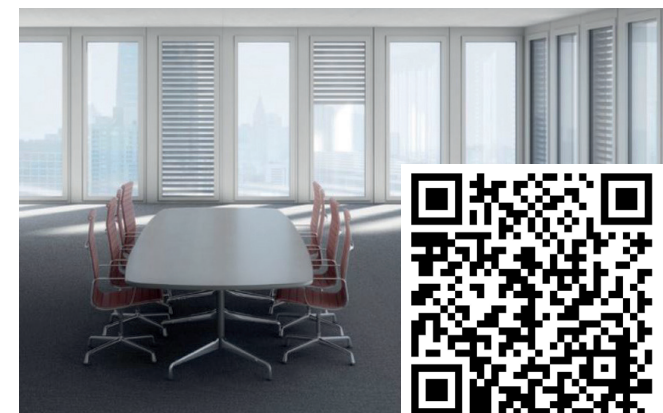
A demonstration unit of the solar thermal venetian blind was constructed as a fully functional, full-scale façade element (1.4 m x 3.6 m). The test façade thus represents a realistic construction for a slim double-skin envelope. The demonstration unit is providing important input for further development up to implementation in specific building projects. An interdisciplinary 3-dimensional planning process was applied to optimise the façade construction and the solar thermal venetian blind with regard to function, construction process and architecture. The test series with the OFREE outdoor test stand at Fraunhofer ISE provided measurement data on operation, control, thermal yield and g value of the façade system under real conditions.



Demonstration unit mounted on the OFREE test stand



Different design variants



Interior perspective



Video of solar thermal venetian blind