Responsive sustainable shading system, Vienna, Austria

Main author
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Project data
Context: Materials, products and construction technologies
Client: EuroLam
Background: Academic research
Patent pending: EP14165178

Summary and appraisal by the jury
The jury commends the exploratory nature of the project and its ingenious approach to problem solving. Particularly appreciated is the simple transfer of a low-technology affair – in this case, an umbrella – to create a high-technology apparatus to shade buildings. Architectural design is here deployed as a method to investigate new sustainable construction techniques. Most successful in this exercise are the double-curved façades that constantly transform according to the intensity of solar exposure.

Sustainability concept
More energy-efficient solutions for cooling buildings have the capacity to significantly reduce the whole-of-life energy consumption of structures. Sustainability should not only be considered as something that saves the earth and helps nature; it should simply raise the question of whether an approach is senseless or not. Air-shade is a continuation of the award-winning "Woolshade" concept that was selected out of 512 projects from 28 countries, and prototyped in 2014.

Air-shade tends to make responsive shading self-sustaining, replacing complex systems with simple natural processes being a high performance and intelligent shading system that works on physical principles. Air-shade consists of multiple shutter units. The main umbrella-like construction of each unit is made out of rods around a metal core with an air container with filtered air. When exposed to solar radiation the air expands its volume and actsuates a pneumatic cylinder that opens the shutters.

Because of its ability to interact with the sun, it responds locally to objects such as buildings, vegetation and clouds. This makes it possible for the shading system to remain open in some places on the building where there is no direct sunlight. The comfort of the user is improved in comparison to conventional shading as well as the thermal regulation of a building. The shutters are slightly offset from the façade to act as a rear-ventilated façade, eliminating heat behind the shutters.

Air-shade could be self-funded in the long term via energy savings, with sustainable banking, governmental/meid-financing as financing in the critical stage of its application.

Further authors

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Air-shade is a response to opening the field of buildings. The size, scale and materials of the shutters can vary, and can therefore be applied on a broad variety of buildings, not constrained by the design or aesthetics of the object they are connected to (which is often the case in sustainable architecture). Mostly all parts are made of inexpensive and accessible materials that do not require complex assembly or production processes and are easily recyclable and/or fabricated. It is a low-tech solution, yet an extremely advanced one with a potential for global application and rapid implementation. Furthermore, it does not need any maintenance, as it is entirely self-sustaining.

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