

Licensing Opportunity

Innovative climate adaptive shading system based on wooden bilayer structures

Summary

We present an autonomous shading device, which reduces the thermal load on buildings by adapting the position of the shading screens in an autonomous way, which means neither motors nor sensors are needed for the operation.

Background

Energy efficiency is an important topic in the building industry. One factor to be considered is the excessive heating of a building due to sun-irradiation. It would be advantageous to protect the building with an adaptable shading system, in order to reduce the thermal load when needed. The shading system itself should be eco-friendly, which comprises low energy consumption, renewable raw materials and low installation and maintenance costs.

Invention

We present a shading device which mimics the natural phenomenon of pine cones opening and closing with the

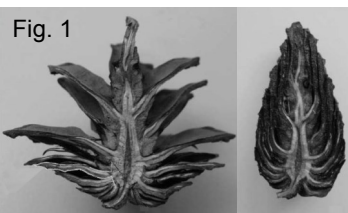


Fig. 1

change of humidity. In this case planks made of wooden bilayers replace the scales of the pine cone. [1,2] In order to translate the intrinsic bending movement of the

material into the rotary movement of a shading element, a new mount was designed.

In one embodiment of the invention both shading element and actuator are made of bilayered wood (see Fig. 2). The actuator is fixed at the bottom of the frame. The shading element is attached to a pivoting mount hanging from the top of the frame. When humidity is high both elements are straight and barely touch each other. When humidity falls, as it usually does within the course of the day, both shading element and actuator bend, rotating the shading element out of the plane towards the sun. The movement is reversible (with humidity) and repeatable.

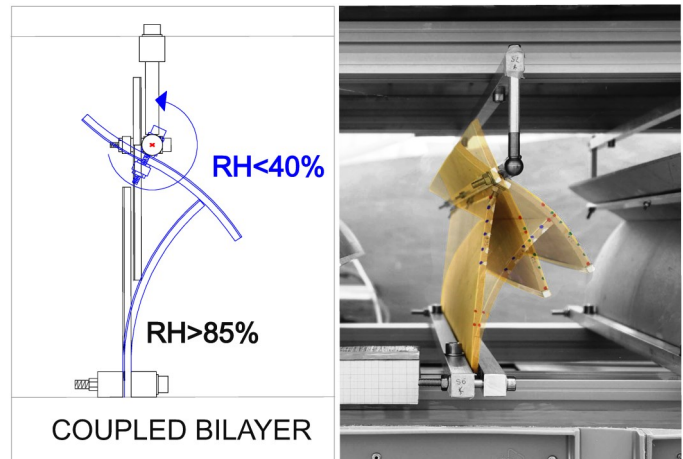


Fig. 2 (left) Technical drawing of the automated shading system. The planks are in a vertical position (black) when humidity is high and bend (blue) when humidity is low. (right) Prototype of coupled planks (140 x 400 mm), overlay in time of coupled plank movements.

Features & Benefits

- Intrinsic responsiveness based on humidity
- Autonomous movement without motors
- Low cost installation and maintenance

Fields of Application

- Reduction of thermal load in the building
- Usable on buildings in different climate zones

Patent Status

- Patent pending

Publication

- [1] Phil. Trans. R. Soc. A (2009), **367**, 1541-1557
- [2] PLoS ONE 10(4): e0120718. doi:10.1371/journal

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Reference: 2016-117
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