

Aerospace | Automotive | Materials Technology | Mechanical Engineering | Technology Offer

Bio-inspired lightweight actuators 'FLEXAFOLD' – composite materials with integrated hinge zones

Field of application

Hinge zones in assemblies usually represent a weak point, since such a mechanism is always associated with locally increased friction and consistent wear. In addition, when movable parts are made of composite material, the difficulty of connecting the mechanical metal pieces firmly and durably with the fiber-containing components arises. The bio-inspired technology 'FLEXAFOLD' developed at the University of Stuttgart is the first solution, which allows users to integrate actuators into panel elements made of composite materials and it thus opens up completely new design possibilities. Potential fields of application include both architecture and lightweight designs in mechanical engineering, as well as in aerospace and automotive engineering.

State of the art

Mechanical assemblies for the actuators of panel elements are not only susceptible to wear, but often also limit the design options and require regular maintenance. Their drive units require a certain positioning in relation to the component to be actuated and take up considerable space close to the elements, which severely limits the range of applications.

Innovation

An integrated actuator system with spatially flexible control and robust, movable structures is therefore a major step forward in terms of design. The concept 'FLEXAFOLD' presented here is based on fillable textile chambers, which are already integrated during the production of fiber-reinforced composite panel elements and are controlled by means of a fluid. The principle originates from the folding of insect wings and stands out for its simplicity and flexibility. The chambers can be arranged as desired and thus enable a freely adjustable folding of the elements or also create a curvature of surfaces – controlled either individually or in groups. The hinge zone results from a special layer structure of different polymers and does not require any additional elements. Only the connection for the actuator fluid must be provided. As fluids such as compressed air can be conducted over long distances with flexible routing, the unit can be positioned far away from the component. Due to the innovative actuators, the concept offers space for further functional elements and structures. The surfaces could additionally be equipped with additional functionalities (e.g. photovoltaic panels).

www.inventionstore.de: Free e-mail service to access the latest IP-protected top technologies.
Copyright © 2018 Technologie-Lizenz-Büro (TLB) der Baden-Württembergischen Hochschulen GmbH

Your benefits at a glance

- ✓ Integrated actuators
- ✓ Lightweight design due to minimum use of additional materials
- ✓ Space-saving as no external actuation is required
- ✓ Infinitely variable, friction-minimized folding in several axes
- ✓ Virtually noiseless actuation due to freely adjustable distance to a compressor
- ✓ Robust structures – suitable for high loads

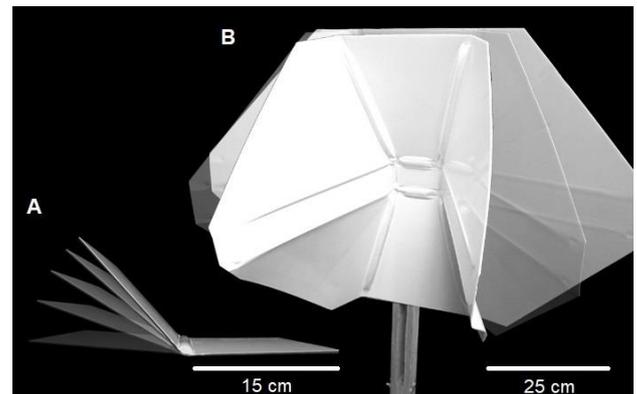


Figure: Demonstrators for single- (A) and multi-axis motion through the combination of several actuators (B) [University of Stuttgart].

Technology transfer

Technologie-Lizenz-Büro GmbH is responsible for the exploitation of this technology and assists companies in obtaining licenses.

Patent portfolio

DE application pending, international planned.

Contact

Dr.-Ing. Hubert Siller
hsiller@tlb.de
Technologie-Lizenz-Büro (TLB)
der Baden-Württembergischen Hochschulen GmbH
Ettlinger Straße 25, D-76137 Karlsruhe
Tel. 0721 79004-0, Fax 0721 79004-79, www.tlb.de

Reference number: 17/061TLB