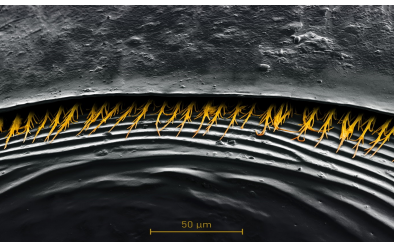


# "BioSpalt" bionically inspired cleaning of technical gaps

Keeping technical gaps clean is an inadequately solved but common problem and of special importance, e.g. for keeping clean the joints of robot arms or joints in prosthetics, sealing the tubes of zoom lenses or door gaps against dust, ... Known sealing lips and brushes have a dirt-spreading, abrasive effect. The presented brush sealing is bionically inspired. Thanks to a coordinated surface structuring on the one hand and a special brush geometry on the other, particles are effectively transported out of the gap. The cleaning effect exceeds those of conventional gap brushes.

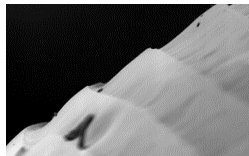


## Limiting the intrusion of particulates into technical gaps

Gold award winner at the international trade fair "Ideas-New Product" iENA 2024 and 2023!  
The simple and effective cleaning principle can easily be adapted to multiple existing technical systems and the respective working environment.  
A demonstrator was realized using the example of a roller shutter. The "BioSpalt" brush cleans the slats with every movement of the roller shutter and prevents particles from entering the roller shutter box.

- 01 highly effective particle transport and cleaning effect
- 02 scalable and adaptable to particle sizes from nm to cm
- 03 simple technical implementation
- 04 low cost solution compared to sealing air or fluid

REFERENCES:  
BioSpalt at iENA 2024



Close-up of the asymmetric, saw-tooth like structure of the skull of the hump beetle.



Close-up of the specially shaped brush hairs on the collar of the hump beetle's back armor.

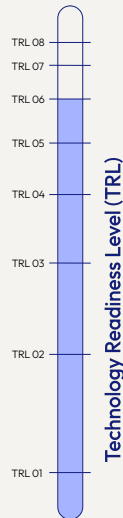


### CHALLENGE

With technical sealings it's not possible to completely prevent dust intruding into technical gaps. This is especially true for gaps between two parts of a device, oscillation relatively to each other. Moreover, once intruded into the gap, it is very unlikely that dirt will be removed again. This is because particle transport with conventional sealings has no preferred direction. Instead, dirt is only moved back and forth with the periodic movement of the device.

### INNOVATION

Inspired by the hump beetle, the invention presents an optimized structuring of one of the two surfaces moving against each other and an advantageous brush geometry for the opposite surface. Flat inclined planes of the structured surface enable particles to be transported with little effort into one direction. The steep edge on the other side allows the particles to be wiped off and prevents them from being transported back. This results in a "net" particle movement along a preferred direction and out of the gap between the device's periodically moving parts.

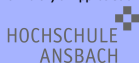


01 Basic principles observed 02 Technology concept formulated 03 Experimental proof of concept 04 Technology validated in lab 05 Technology validated in relevant environment 06 Technology demonstrated in relevant environment 07 System prototype demonstrated in operational environment 08 System complete and qualified



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