Noise protection: Multifunctional and aesthetical

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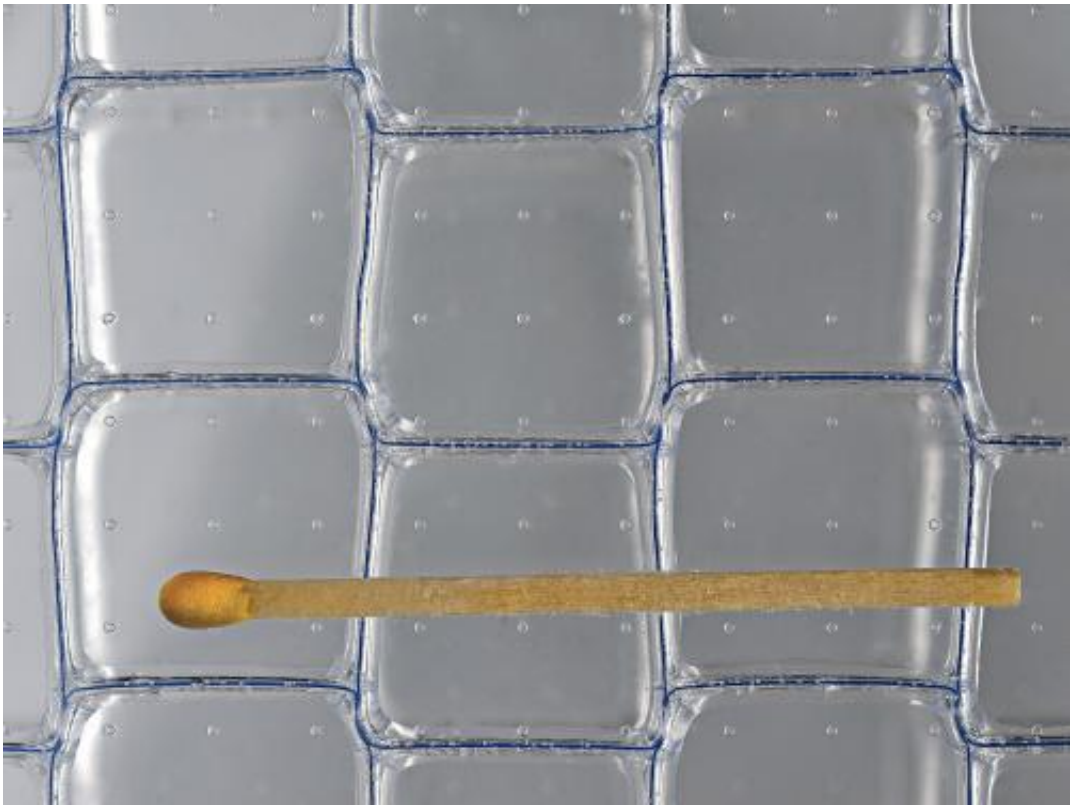

Self-supporting microperforated honeycombs adapt to a variety of uses and blend in well with the overall architectural concept. Credit: Fraunhofer IBP

Noise abatement is growing in importance, thus, the demand for better acoustic building components raises. Scientists are developing new solutions: aesthetically good looking and flexibly applicable microperforated sound absorbers.

Too much noise causes illness. This is as an undisputed fact nowadays, and yet we're still constantly assailed by noise as we go about our daily lives, be it from traffic or voices in large open-plan offices. Noise pollution can be reduced with the help of structural solutions; we've all seen noise barriers along busy roads and train lines, and there are special acoustic structural components, so-called sound absorbers, which are used inside buildings to keep noise levels down. But there's a problem. The construction components used up until now may well be effective at reducing noise, but they are not often very functional. Architects who incorporate soundproofing measures into their designs often complain about the inflexibility of modern materials. Limiting factors that affect the choice of material include weight, fire resistance or the hygienic requirements involved when designing large-scale kitchens or laboratories. After all there's also an aesthetic aspect; hardly anyone would say that a solid concrete wall along a road was attractive.

Scientists at the Fraunhofer Institute for Building Physics IBP are working on new solutions. "One of the main things we are focusing on developing is microperforated construction components. This technology is suitable for all types of material and enables the production of multifunctional, visually appealing sound absorbers that can be used for a flexible range of applications," explains Prof. Dr. Philip Leistner, acting institute director and head of the acoustics department at the IBP. Microperforated absorbers consist of membranes or sheets that have been perforated with a multitude of tiny holes or slits. When sound waves strike the surface as oscillating air molecules, friction is generated between the air in motion and the edge of the miniscule openings. It is this loss of energy that results in the sound being absorbed. The only prerequisite is that there is an air chamber located behind the openings, to allow the molecules to continue oscillating once they have passed through, as otherwise the sound would simply be reflected. Depending on the material, the holes are drilled, punched or pricked. "Above all, it's a question of cost efficiency," explains Prof. Leistner. "When it comes

to ensuring the manufacturing process is cost-effective, it's important to realize that not all methods are equally well suited for every material." For it goes without saying that despite all the advantages they offer, sound absorbers must also remain affordable. Stuttgart staff and their industrial partners have already worked together to develop a whole generation of market-ready microperforated acoustic construction components. The technology means that, for the first time, it is possible to make sound absorbers that are both transparent and translucent. When mounted onto building façades or as noise barriers at the roadside, these materials have the desired effect without detracting from the landscape, and they can also be superbly integrated into the interior architecture of buildings.

Elastic surfaces for hygiene-sensitive areas

New additions to the sound absorber family are expected thanks to the latest developments at the IBP. Scientists there are working on elastic surfaces that are made of tubes arranged side by side, with microscopically small spaces in between. "It's a bit like having a brush with bristles that are enhanced by little extra attachments at the ends – only much denser," explains Prof. Leistner. Such a pliable surface means even micro-holes can be cleaned easily, making it a material that is particularly suitable for use in hygiene-sensitive areas. Extrusion technology has proved especially cost-effective for large-scale applications. This method produces a two-dimensional surface profile with micro-slits, air chambers and base plate by pressing materials such as plastic or aluminum through a shaped nozzle. In the same way as with window and façade profiles, this creates finished, one-piece absorber components that come off the production line as a continuous length of material, eradicating the need for complicated mounting procedures which proved often more expensive than the material itself. Fraunhofer scientists will be presenting prototypes of these new developments alongside tried and tested solutions at the BAU 2013 construction trade

fair from January 14-19 in Munich (Hall C2, Booth 131/135).

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