

Quiet area for sensitive devices

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Devices for precise analysis or manufacturing are very sensitive to ambient vibrations. The German experts at Fraunhofer have developed an insulation unit that actively counteracts these effects emanating from the environment. This compact and flexible system can be viewed at the Hannover Messe trade fair at the booth of the Fraunhofer Adaptronics Alliance in Hall 2, Booth D18.

It is difficult to write a letter on a driving bus, or to measure small distances on a vibrating plate – the vibrations simply interfere too much. Any small vibration coming from the floor is already too much if there is an increased requirement with respect to accuracy. They hamper high-resolution measurements of distance or roughness – as in scanning electron microscopy. They are also not desired in production if precision is a requirement. For this reason, the devices must be settled in such a manner that they are stable and quiet. Damping is necessary also when the machines/devices themselves vibrate and this movement is not supposed to be transferred to the flooring.

The adaptronics specialists of the Fraunhofer Adaptronics Alliance have developed an [insulation](#) unit that meets these requirements and is compact at the same time. With the help of piezo-electric ceramics, the researchers were able to integrate all necessary functions into a single, adaptronic component. It provides requisite rigidity, registers vibrations and counteracts them actively. This makes the unit superior to the current solutions for vibration insulation. In contrast to passive solutions – for example, using rubber elements under machines – the new solution works at even very low interference frequencies. However, traditional

mechatronic insulation systems are able to do that as well. They actively attract the forces, just like the platform, and then counteract the movement, so to speak. Their disadvantage: they are comparatively large and consist of many components.

"One of the particular advantages in the insulation unit that we developed lies in the implemented digital control. This results in a particularly high flexibility, which cannot be achieved in this manner using analog controls," says Dr. Tobias Melz, managing director of the Fraunhofer Adaptronics Alliance. "The platform can be used not only for small machines or devices, but also for large ones, as it is relatively easy to adapt with respect to size. Our system can be implemented in such a compact and flexible manner that it could be integrated directly into the machines, for example into measuring instruments and production systems. The respective system need not be set up on a platform; rather, it is able to insulate itself from the vibration," explains Dipl.-Ing. Torsten Bartel, the responsible project manager at the Fraunhofer Institute for Structural Durability and System Reliability LBF.

Torsten Bartel and his colleagues are presenting the platform at work at the Hannover Messe: It already insulates against vibration in one spatial direction and two rotational movements. In addition, the experts are introducing an element that makes it possible to achieve damping effects in additional spatial directions. In the future, they want to expand the platform such that it will dampen all six directional movements of the setup machine/device.

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